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MODEL AIRPLANE NEWS

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—page 54

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MODEL AIRPLANE NEWS
FOUNDED 1929

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MODEL AIRPLANE NEWS

JANUARY 1999 • VOLUME 127, NUMBER 1

ON THE COVER: this painting of the Douglas SBD Dauntless dive bomber by the late Jo Kotula graced a previous cover of Model Airplane News. *Do you know which issue it was? The first 5 readers to supply the correct answer will win free subscriptions (or extensions of their existing subscriptions). Mail your answer to: Jo Kotula Cover, c/o* Model Airplane News, *100 East Ridge, Ridgefield, CT 06877-4606 USA.*

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EDITORIAL

BY LARRY MARSHALL

"In presenting Model Airplane News to the reading public, it is fitting that we dedicate its pages to America's greatest investment and finest possession: our boys and girls.

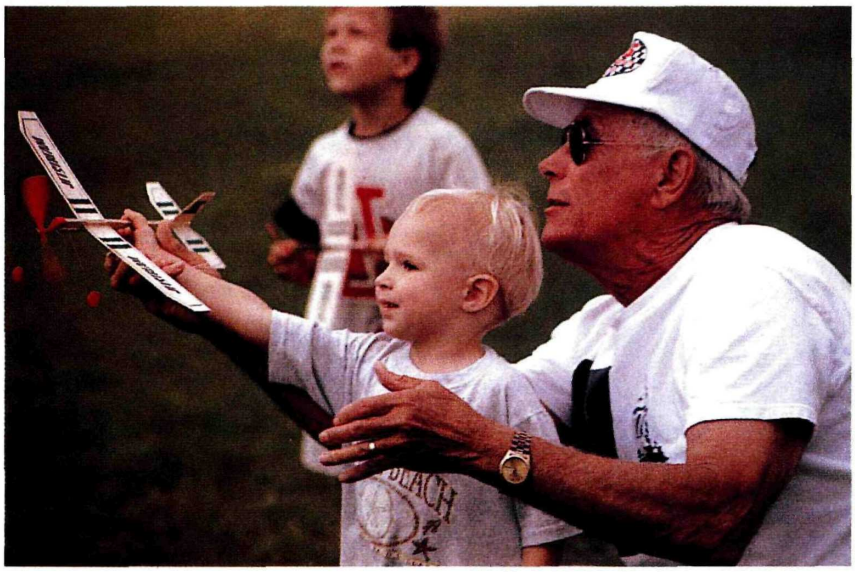
"The fact that the building of model airplanes has become Young America's favorite pastime should suffice as the inspiration for any publication of youth, but to you–mothers and fathers of America–we present a deeper and more significant message.

"Through the medium of pleasure, model building brings to our boys and girls four vital and enduring assets, which, when mastered, will better equip them to manhood and womanhood.

"These consist of health, knowledge, manual training and a higher sense of fair play through competition."

—Edwin Hamilton, editor, *Model Airplane News*, 1929

When *Model Airplane News* was launched 70 years ago, it was a magazine directed primarily at children. 1929 was the "Lindbergh era," and kids were looking to the skies for all their dreams. The second issue of *Model Airplane News* announced the creation of the McFadden Sky Cadets, a kids' organization that promoted the building and flying of model airplanes. Only two issues later, this organization was renamed the American Sky Cadets, and it would come to represent one of the largest of this genre of organizations, of which there were many during the '30s. The early issues of *Model Airplane News* weren't just about modeling; they were heavily imbued with stories about aviation (heroes chasing cattle rustlers with airplanes and such). There was no television; there were no computers. "Pulp fiction" was in its heyday, and *Model Airplane News*, *Air Trails* and *Flying Aces* brought story after story to kids who dreamed of becoming Tailspin Tommy or Bill Barnes. There was some modeling, too, but any fair assessment would be that modeling, in those early years, played second fiddle to storytelling.



We have a bright future ahead of us. Here, Raymond Curry gets a lesson in flight trimming from his grandson. Helping others is what binds us all together.

As I look at *Model Airplane News* in 1999, it's clear that 70 years have brought many changes to our hobby. These days it's dominated mostly by adults, and the models now run the gamut from simple to very complex. The models being constructed today are marvels of engineering; many are also pure art. It's truly surprising that their owners are still willing to risk them to flight, though most model aviators thrive on seeing their latest creations fly.

Interestingly, we seem to be living in a time in which many modelers are rediscovering the more simple forms of model aviation; each has his reasons. For some, it's time constraints that simply don't allow the luxury of devoting several hundred hours to a single model. For others, it's space; modern living has left many modelers with very small building areas. For some, it's cost; clothing costs, tuition and other day-to-day expenses seem to grow faster than the paycheck.

But the funny thing is, I've watched modelers "succumb" to some of these constraints and then build a simple model and start smiling—*a lot*. They start saying things such as "Wow, this is fun" and "I never knew I could have this much fun." This is another big reason we're seeing the resurgence in small airplanes, free flight and control line. How can you listen to this and watch it happen without being bitten by the bug yourself? And so it goes; more and more people are flying small planes.

The truly exciting observation is that people are still flying large planes, too. Interest in helicopters is on the rise. Jets seem to continue to grow in popularity. This diversity has got to be good for our hobby; I know the industry people are happy about it. The next millennium should be an exciting one for our hobby. I hope to see you on the flying field in the upcoming year.

PLANS DIRECTORY

One of the cornerstones of model aviation is the model plan. Most guys I know have more plans than they have anything else. Plans have a life beyond a simple description of a model airplane. They serve as centerpieces for discussion about construction techniques. They allow us to dream of planes we're going to build. Plans show up at club meetings at show 'n' tell and in pit areas as "Tell me what ya think" pieces. And plans give us modelers something to collect, much like postage stamps.

I've owned several hundred plans, and I've gotten more value from the small amount of money spent on them than from anything else I've purchased over the years. So I'm happy to announce that this issue of *Model Airplane News* includes our 24-page catalog that provides info on all the plans we currently have available. It's eight pages longer than it was last year and so reflects a larger selection of what we feel are designs from some of the best designers on the planet. Studying some of these plans could serve as a course in model design. If you simply want to have fun building a model, we hope you'll find something that appeals to you. Most of all, we wanted to provide the catalog as a no-cost service to our readership.

New products or people behind the scenes; my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

AIR SCOOP

BY CHRIS CHIANELLI

Wingo

AN R/C BREAKTHROUGH

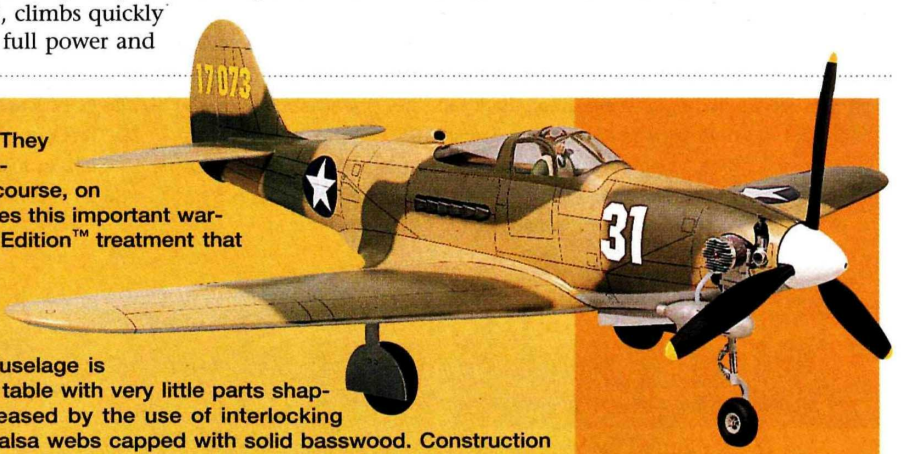
Simply stated, the Wingo is World Champion genius, molded in foam. Conceived by one of Germany's top electric team's top designers, Wingo draws upon world championship-winning airfoil technology. This electric-powered model is only three hours from flying after you open the box and is powered (actually, slightly over-powered) with only a tiny Speed 400 motor that flies the model for 10 minutes in power-on flight. While designed with beginners in mind, the Wingo is actually being purchased in Germany mostly by experienced R/C flyers because this efficient design flies so darn well; according to reports, it flies better than many expensive, high-tech airplanes.

You need only 5-minute epoxy and a pair of scissors to follow the simplistic, clear, illustrated instructions! All parts are keyed or slotted, so correct assembly is ensured. The rudder and elevator pushrods are ready-made and cut to length. If you hate soldering wires and figuring out which wires to connect, you'll love Wingo because all the recommended components are "plug-and-fly" ready.

According to Jim Martin of Hobby Lobby International, "If you've never flown a radio-controlled model airplane and you don't have someone to help you on the first flight, you will probably have a better chance of successfully flying Wingo than any other R/C model airplane in history. Flying is what Wingo does best. Experienced R/C flyers consider it one of the best-flying R/C airplanes they have ever flown. Why? Because it takes off promptly (even at partial throttle), climbs quickly on full power and has plenty of power to get out of dangerous situations by turning promptly and precisely. It's excellent for confined spaces and lands at very slow airspeeds without stalling."

Wingo includes: prewired Speed 400 motor, propeller, special lightweight large-diameter wheels with rubber tires, preformed steel wing struts, correct length pushrods, hardwood laminated balsa tail boom, special stick-on control surface hinges, control horns, rubber band wing hold-on and a molded-foam carrying case. Specs: wingspan—43 inches; wing area—400 square inches; length—35 inches; weight—about 20 ounces ready-to-fly; radio functions; rudder, elevator and throttle, mini or microservos required. A video is available from Hobby Lobby that gives a close look at Wingo flying; it's $9 ($6 refunded if returned).

Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948.



GOLD EDITION P-39

Allied infantrymen loved the P-39 Airacobra. They considered it "airborne artillery" that supplied lifesaving ground support, depending, of course, on which side you were on. Top Flite commemorates this important warbird in 1/7 scale by giving the model the Gold Edition™ treatment that does the full-size warbird proud!

As in the entire line, Gold Edition engineering gives the P-39 accelerated assembly and exciting scale appearance. Modelers will appreciate that the sheet-and-stringer round fuselage is not only lightweight, but also builds flat on the table with very little parts shaping or carving required. Wing strength is increased by the use of interlocking "I-beam" spars made of spruce and notched balsa webs capped with solid basswood. Construction is further simplified by locking ribs, which automatically space ribs correctly. The kit includes a precision-formed canopy, wing fairings and exhaust ports. The nose gear, which is patterned after that of the full-size P-39, offers familiar, trainer-like ground handling to boost a pilot's confidence during take-offs and landings. The instruction manual includes directions on how to create split flaps, an assembly option that adds maximum authenticity and slows the plane's approach speed to a crawl. And with its light overall weight, this warbird is an exceptional flier with an economical .61 engine.

Optional scale touches include: scale cockpit kit with joystick, seatbelt material and instrument panel; 1/7-scale warbird pilot figure; 3-blade static prop and drop tank.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

1/2A Piper Cherokee

The super-precision laser cutters at Herr Engineering now offer this gorgeous little 1/2A sport/scale Piper Cherokee. Similar to others in the proven Herr line, the Cherokee is quick-building and handles great in the air. With tricycle landing gear and steerable nose gear, the Piper also offers superior ground handling on takeoffs and landings. Its computer-designed, high-lift airfoil provides rock-solid stability at all speeds. The Cherokee can use standard servos, but smaller airborne packs allow significant weight savings, which enhance performance even further. Kit features: all laser-cut parts; tab-and-notch construction for quick and accurate assembly; 3-D CAD design for precision fit; computer-drawn plans; quality hardware pack; prebent landing gear legs and step-by-step instruction manual. Specs: wingspan—42 inches; wing area—293.3 square inches; weight—19 ounces; wing loading—9.32 ounces per square foot; engine required—.049 to .061.

Herr Engineering Corp., 1431 Chaffee Dr., Ste. 3, Titusville, FL 32780; (407) 264-2488; fax (407) 264-4230.

A Noble Hawker

Clark Industries brings you the Battle of Britain hero in 1/4 scale. This venerable Hurricane sports a 120-inch wingspan; 2,318.40 square inches of wing area; Clark fail-safe, pneumatically operated undercarriage and a Clark Merlin 105cc, 10hp, gas/ignition, in-line twin engine. Wing and stab structure is spruce, plywood and balsa that is sheeted and covered with 2/3-ounce fiberglass cloth and resin. The fuselage is hand-laid fiberglass with molded-in detail. Other specs: length—96.5 inches; wing loading—47.7 ounces per square foot; weight—48 pounds. Kit may be built as any of the MK II Hurricanes from the eight-gun MK IIA to the MK IID "Tin Opener" with two 40mm cannons.

Clark Industries, R.R. 4, Tottenham, Ont., Canada LOG 1WO; (905) 936-2131.

HIROBO

Sky Trend ARF

Designed by Mr. Naruke, '97 F3A world champion, this clean-looking trainer is fully assembled, is of all-wood construction and features a Mylar-covered wing. Specifications: wingspan—53.3 inches; length—43.3 inches; flying weight—3.5 pounds; engine required—.20 to .25 2-stroke. This is a full kit and includes: tank; prop; spinner; full hardware package; pushrods and wheels. For more information, contact: Altech Marketing, P.O. Box 7182, Edison, NJ 08818; (732) 225-6144; fax (732) 225-0091.

ZIROLI

Goes "PROFILING"

I thought you guys might be interested in reading about some non-giant-scale things that Nick Ziroli Sr. has been up to lately. These are 48- to 50-inch wingspan profile models of famous WW II fighters. They were designed for aerobatic and combat flying and call for .40 to .50ci engines. Despite their overgrown proportions, these models appear quite realistic in the air, according to Nick, and we all know that Mr. Nick (or Uncle Cranky, for those of us who are close to him) don't lie!

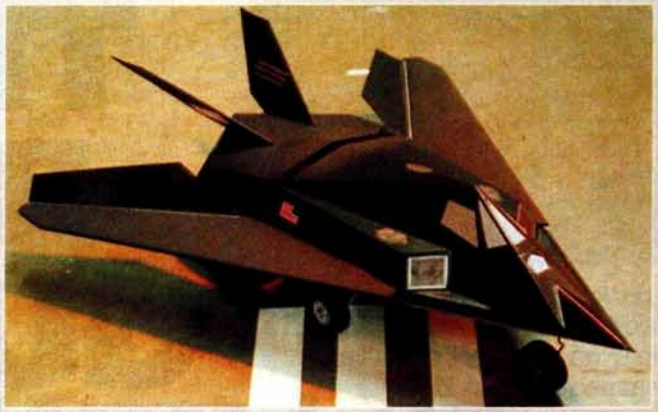
Currently ready to go is a P-51B, P-51D, Me-109 and Zero. (P-51 plans show both B and D versions). By the way, the Zero was a first-time building project by a modeler whose previous experience included only ARFs. Soon to be available are a Hellcat, P-40 and an FW-190.

Plans are available from Nick Ziroli Sr., 686 E. Monroe St., Little Falls, NY 13365-1547; phone/fax (315) 823-1208.

Complete high-quality kits (including plans) are available from: Madden Model Products, 278 Horicon Ave., Brant Lake, NY 12815; (518) 494-7408.

KINETICS

F-117



The Lockheed F-117 Nighthawk, known to some as the Baghdad Barnstormer, is now available with electric power from Kinetics. The model's fuselage/body construction is vacuum-formed ABS plastic and features simulated radar-absorbing surface texture. The outboard wings are of balsa. Assembly time is eight hours. The kit comes complete with an electric propulsion system, yet can be easily converted to glow power. Only a 3-channel radio is required for motor control and a 2-channel mix for elevons providing roll and pitch control. Specifications: wingspan—24 inches; length—29 inches; propulsion—Speed 400 or 540, or 0.49 glow.

Kinetics Inc., P.O. Box 1071, Mercer Island, WA 98052; (425) 641-5611.

One Design .40

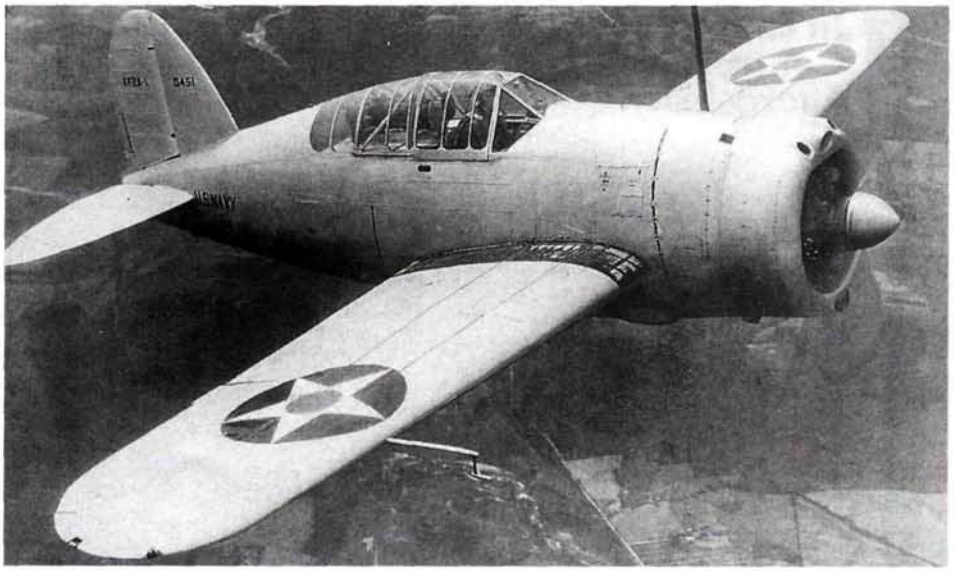
In keeping with our policy of bringing you the newest (before anyone else), take a look at this One Design introduced by Hobby Hangar. You really did see it in *Model Airplane News* first because we presented it as a construction article by Rich Uravitch in the April '98 issue. Hobby Hangar has taken Rich's design to kit form and done some neat things to make it even easier to build. All the wood parts are either machine or laser-cut—even the capstrips! The formed plastic parts package includes the cowl, wheel pants and canopy. The landing gear is of rugged 6061ST aluminum. The plans are full size, and the photo-illustrated construction manual walks you though every step of assembly. While the 47.2-inch wingspan One Design is perfect for sport/scale events or just plain sport flying, its true 1/5-scale size makes it ideally suited for the new MINIMAC competition.

Hobby Hangar, 1862 Petersburg Rd., Hebron, KY 41048; (606) 334-4331.

AIRWAVES

Our readers write back

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA; email man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.



BREWSTER BUFFALO

In the November 1998 "Scale Techniques" column by Bob Underwood, there was a photo of a Brewster Buffalo model built by Max Merckenschlager (photo by Stan Alexander). The Buffalo is one of my all-time favorite aircraft but I have never been able to find a kit or a plan for it. Where can I get a set of plans for the Brewster Buffalo? I would appreciate any help you could provide.

DAVE CORDIVARI
West Chester, PA

Dave, the Brewster Buffalo is indeed an unusual scale R/C model subject. A small plan for the Buffalo by Don Williams is listed in the catalog from Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92404; (909) 885-3959. This stand-off scale model is intended for .45- to .60-size engines and has a wingspan of 54 inches.

Another source is Gus Morfis. He has a neat, 1/12-scale R/C combat plan for the Buffalo. Contact him at 4709 Green Meadows Ave., Torrance, CA 90505-5507; (310) 378-5679.

Jerry Bates also has a Buffalo; his address is 102 Glenwood St., Mobile, AL 36606; (205) 478-6720. Hope this helps. GY

BIG WIRE THOUGHTS

Regarding the "Thinking Big" column and the trend toward larger models: in my opinion, the number of servos required overloads the wiring harnesses and switches that we use. It seems to me that it would be easy to increase the wire size and get a huskier switch. Also, I think twisted, shielded wire should be used for the long servo leads. I fly an 84-inch Lazy Ace with two receivers and eight servos, and it seems as though I have wires running everywhere. Whenever I get a glitch, I wonder if it was caused by all those unshielded servo leads. The two receivers and two battery packs are greatly reliable but I wonder if I am losing it with all the required wires. [email]

RICHARD H. KELLY

Richard, it is true that with some big birds, the length and number of servo lead wires increase. In the past, glitching was a major concern for big bird fliers, specifically those with older, AM band radio systems. With the newer radio systems, however, long leads are much less of a problem, but it is still important to keep these wire leads as short as possible. This simply means your servos should be mounted only as far out in the wing as necessary, say, to the inside edge of the ailerons, instead of in their center points. Many modelers now install the RX aft of the wing saddle to keep all leads (throttle as well as elevator and rudder) as short as possible. It makes little sense to place the RX up under the cockpit and have excessive wire bundled up in the front of the fuselage, while still needing two or more 12-inch servo extensions to get to the rudder and elevator servos. There is no IMAA rule that says your servos have to be mounted in the tail or wing panels. If you experience glitching, and you suspect your long servo leads, then install pushrods to keep the servos close to the RX. Pushrods with 4-40 hardware are safe and very effective even in giant-size models.

Today's electronics filter out most glitches even with long leads included in the setup. Some giant-size servos do come with larger-gauge wire leads, and larger switches are available at the hobby shops. It is also important to use larger battery packs (1000 to 1200mAh) to handle the increased servo loads and to make all your installations as neat and as straightforward as possible. The best way to avoid problems is to use modern radio systems and keep everything as simple as possible. GY

PBY PLEASE

I would like your help, please. Where can I find some William A. Wylam 3-view drawings? I would also like to find drawings for a Catalina PBY-6A or 5A for my next R/C project. I'm not looking for building drawings, but rather for scale 3-view plans. Thanks for your help.

BJARNE FEISTED
Rudkobing, Denmark

Bjarne, you're in luck. In this issue, you will find the latest Model Airplane News plans directory. It contains a section of Wylam drawings, including his Consolidated Catalina Dumbo PBY (item number WWP02020). You can order your plan from the plans directory.

Another place to check for Catalina plans is Bob Banka's Scale Model Research, 3114 Yukon Ave., Costa Mesa, CA 92626; (714) 979-8058. Bob has seven different PBYs listed in the 3-view section of his catalog.

GY

PILOT PROJECTS

A look at what our readers are doing

SEND IN YOUR SNAPSHOTS. ***Model Airplane News*** **is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.**

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

TARHEEL T-BOLT

This P-47 photo was sent to us by John Cassar of the island nation of Malta. He used Ziroli plans to build the 92-inch-span model and powers it with a Precision Eagle 100cc engine. The plane has functional retracts and working doors, flaps and lights. It's covered with aluminum and weighs 40 pounds. John writes, "It has excellent ground handling, due to its wide under-carriage."

ELECTRIC AERONCA

John Swetland of Duluth, MN, writes that this ¼-sport-scale C-1 is the "best flat-turn aircraft" he has ever built. The 88-inch-span, 82-ounce model is his own design; it uses an AstroFlight 15 with a 3.69:1 SuperBox on 12 cells and spins a 16x6 wooden prop for power. The model is outfitted with functional flying wires and 4½-inch Trexler wheels. John has measured the Aeronca's climb rate at 400 feet per minute.

STUBBY 100

"The Stubby is a flat-bottom floater that just happens to be extremely aerobatic and extremely forgiving," writes Ron Daniels of Kitchener, Ontario, Canada. He designed the 101½-inch-span plane using DesignCAD 3D. The wing and fuselage are fully sheeted, and the aluminum wing struts are functional. Power is provided by a SuperTigre 4500 engine with a custom muffler.

LIL STINKER

Rick Esler of Newbury Park, CA, covered and painted this Midwest model after John Minasian framed it up. Using photos from Bob Banka's Scale Model Research as guides, Rick dressed the model up with 21st Century covering and K&B Superpoxy. The Lil Stinker uses an O.S. Super Gemini FT-3000 swinging a 20x8 prop for power and has unlimited vertical performance at full throttle. The model is owned by Bill Lovern of El Segundo, CA.

JETTIN' AROUND

This Bob Violett Models Maverick was built by Edmund J. Coppa of Babylon, NY. The jet is powered by a BVM 91 with a BVM fan unit, and it features scale wheels with air brakes and retracts. Edmund painted the model with automotive paint and added two pilot figures and dash panel fire extinguishers. He adds, "This jet is a great flier, with good handling characteristics."

TUSKEGEE P-51D

Orie Velez of Allentown, PA, built this giant-scale P-51D from the Top Flite kit with help from his friend Carl Guttman. The model is glassed with water-based polyurethane and painted with automotive lacquer, and it has sequencing inner doors, Century Jet retracts, a full scale cockpit and sliding canopy. At 28 pounds, the P-51D flies well with a Quadra 52. Orie writes, "We feel it is a true tribute to the brave men of the 332nd Squadron, who accomplished so much in light of overwhelming odds as well as the bigotry and prejudice they had to endure."

1/4-SCALE CLONE

Phil Coopy of Calverton, VA, built this model Cessna 140 for Rick Matson, who owns the full-scale version. Constructed from enlarged Bob Holman plans, the 20-pound model features metal flying surfaces and is painted with Du Pont auto finish. A Saito 150 keeps the smaller version flying high.

1928 CURTISS ROBIN

This Ikon N'West Curtiss Robin Challenger was built by David Friley of Lancaster, KY. It has a 98-inch wingspan and uses a SuperTigre 2000 for power. David says that the Challenger flies like a big trainer.

TAM TRANSPORT

Odemir Do Couto Filho of Sao Paulo, Brazil, scratch-built this Fokker 50 out of foam and wood. The model has a 78-inch wingspan, weighs 13 pounds and uses two Saito .56 4-strokes for power. Odemir writes, "This model won fifth place in the Brazilian Cup in Rio de Janeiro last year."

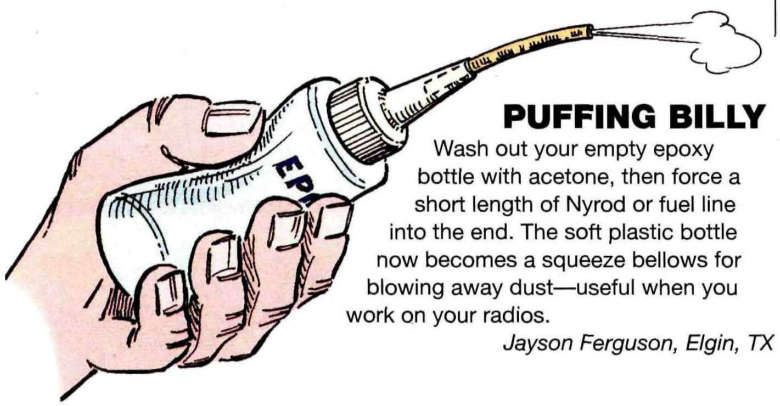
FIRST TWIN

Rodolfo Caceres of Concord, CA, built this Horizon Models Otter as his first twin-engine project. The 16-pound, 83-inch-span Otter features a fully equipped cockpit and a true front windshield and side windows. Two Saito Gold Knight .65 4-strokes with onboard electronic ignition keep it in the air at speeds of more than 40mph. Rodolfo notes that the paint scheme is based on NorOntair, a former Canadian airline and transport company.

HINTS & KINKS

BY JIM NEWMAN

SEND IN YOUR IDEAS. ***Model Airplane News*** **will give a free, one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman, c/o *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.**



PUFFING BILLY

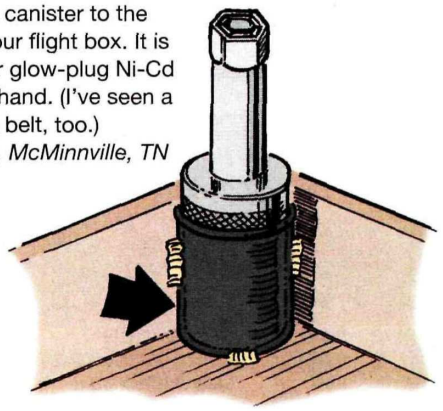
Wash out your empty epoxy bottle with acetone, then force a short length of Nyrod or fuel line into the end. The soft plastic bottle now becomes a squeeze bellows for blowing away dust—useful when you work on your radios.

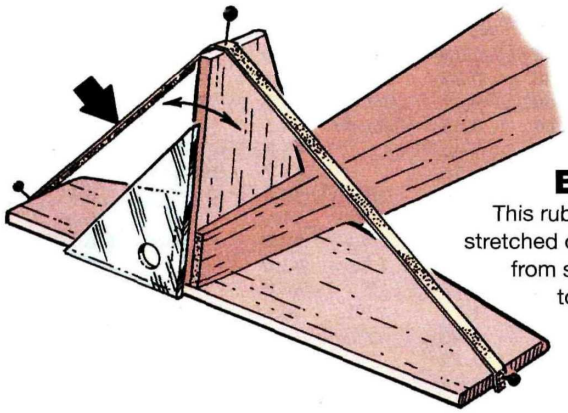
Jayson Ferguson, Elgin, TX

NI-CD CADDY

Hot-glue a 35mm film canister to the inside or outside of your flight box. It is a great holder for your glow-plug Ni-Cd and keeps it ready at hand. (I've seen a canister attached to a belt, too.)

Marty Waldron, McMinnville, TN

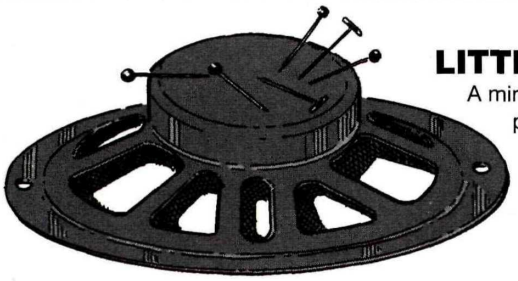




BAND STAND

This rubber strip, cut off a rubber band or an old rubber motor, pinned and stretched over the fin will hold it vertical while you glue it in place. Slide the fin from side to side under the rubber to make it vertical, then pin the rubber to the fin until the glue sets.

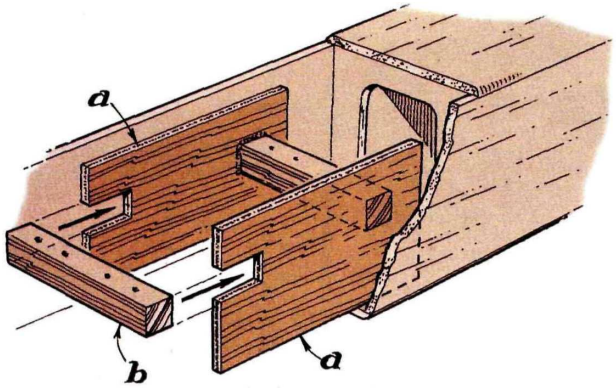
Roy McGuckin, San Diego, CA



LITTLE SPEAKER, BIG USES

A miniature speaker from a scrap radio is useful for waving over the floor when you spill pins. It then doubles as a pin caddy on the bench, where that powerful permanent magnet will hold your pins ready for use. The frame is a useful non-tip base, too.

Paul Hochstedler, Seaford, DE



EZ SERVO MOUNTING

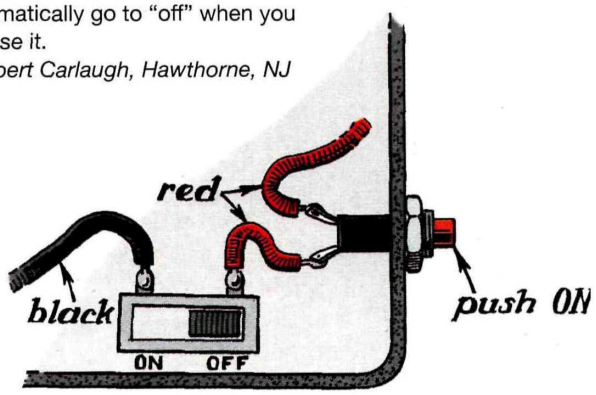
Only one of the servo mounting rails is glued into the plywood doubler (a). The other rail (b) is firmly push-fit into the open-ended slot. This makes it easy to put the servos in place without pinching the servo wires off the end of the servo case.

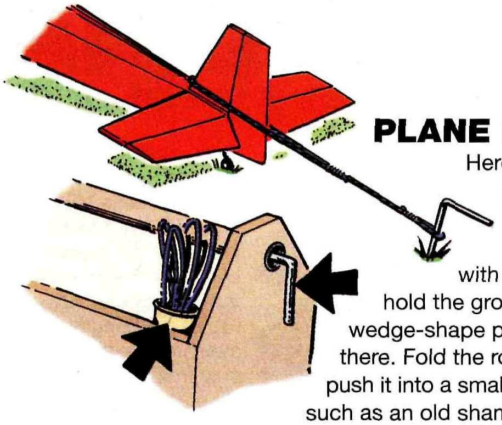
Fred Burman, Nowra, NSW, Australia

TACHS RELIEF

Tired of dead tachometers because you forgot to turn off the slide switch? A miniature pushbutton switch that's spring-loaded to "off" requires only a 3/16-inch (5mm) hole in a convenient part of the case, where you can operate it with a finger or thumb. Just cut the red lead off the slide switch then solder the ends to the tabs on the switch. Leave the slide switch on then press the pushbutton when you need an rpm reading. The pushbutton will automatically go to "off" when you release it.

Robert Carlaugh, Hawthorne, NJ

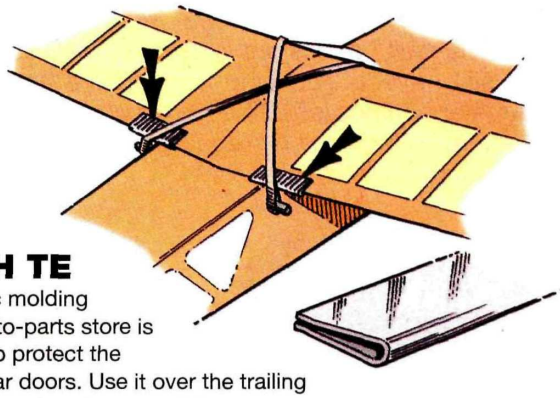




PLANE RESTRAIN

Here's a neat way to stow your plane restrainer. Equip your flight box with a hollow handle to hold the ground spike, then use a wedge-shape pencil eraser to keep it there. Fold the rope into a hank, then push it into a small, empty plastic bottle, such as an old shampoo container.

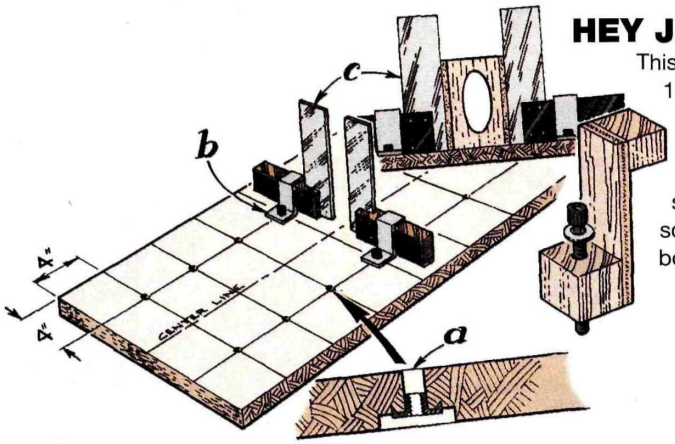
Jeff Penny, Lyons, KS



TOUGH TE

This plastic molding from an auto-parts store is designed to protect the edges of car doors. Use it over the trailing edge of your wings to prevent the rubber bands from cutting into the balsa. It comes in many colors, too.

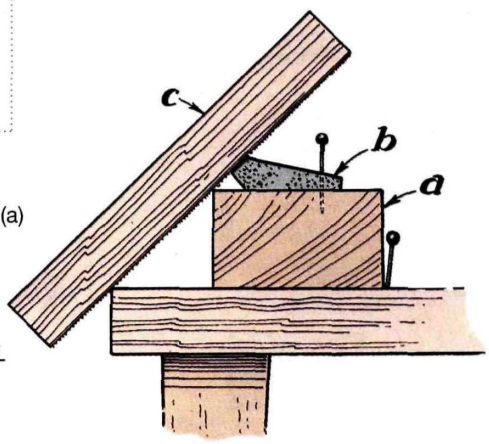
Don Baker, Aiken, SC



HEY JIG-A-JIG

This simple jig guarantees straight, square, box fuselages. The baseboard is 1x16x60-inch (25x400x1500mm) particle board, on which is drawn a 4-inch (100mm) grid. Counter-bored holes (a) drilled where shown accept ¼-inch (6mm) Allen-head screws and blind nuts. Make clamps (b) from plastic, metal, or wood to hold down the inexpensive carpenter's squares (c), often found in discount store sales. Adjust the position of the squares to keep the bulkhead centerlines over the jig centerline. Lawrence bought 15 squares for his jig.

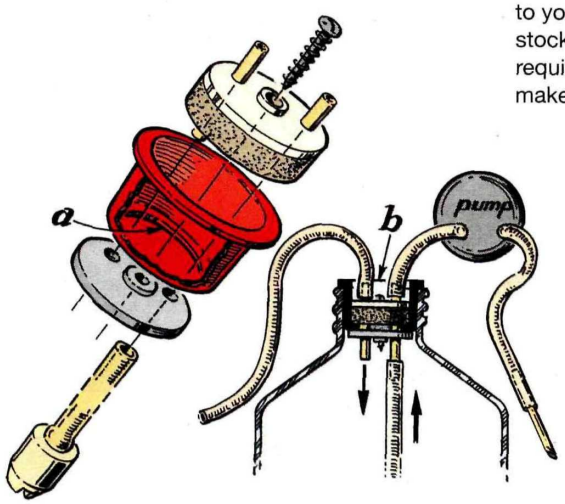
Lawrence Dickinson, Anaheim, CA



TWO BY SANDER

Secure a 2x4-inch (50x10mm) piece of lumber (a) to your bench, then pin your aileron/elevator stock (b) to it. Adjust the positions as required, then use your sanding block (c) to make accurate bevels as shown.

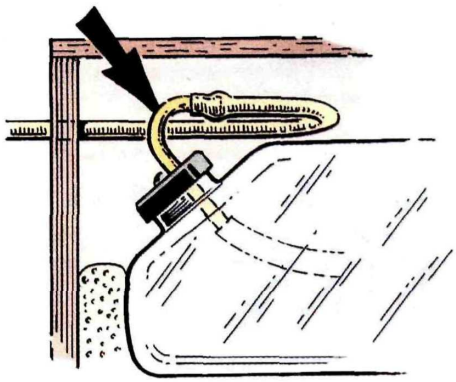
Kevin Pazda, Lakeland, FL



TANKS A LOT

Vince has saved himself many pinched and cut fuel lines by bending his brass feed tubes as shown. It takes a little more rubber line but, when the tank shoots forward in a sudden stop, there is no chance of pinching the fuel line between the tank and the firewall.

Vince Cahill, Milton,



CHUG-A-LUG PLUG

Cut the bottom off a red plastic plug from a fuel jug, leaving a wide flange (a) around the base. Fit a regular fuel tank stopper assembly into the cap, with a long dip tube and clunk weight to reach the bottom of the jug. If you leave the brass tubes below the top of the red plug (a), you will be able to pull off the fuel lines, then fit the regular screw-on cap for storage. A fueling probe goes into one tube while the other plugs into the model's overflow to stop fuel waste and ground contamination. Plug the two lines together to seal your jug between refuelings.

Stew Pickford, Seattle, WA

GRASSROOTS

Reports from readers around the world!

by Rick Bell

Send in your event coverage. Mail photos, captions and text (500 words or less) to "Grassroots," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. Color slides and prints are acceptable.

Maryland Helicopter Association Fun Fly

Helicopters hovering inverted; the sound of rotor blades enduring flips and tumbles. Look over there—a scale Bell 222 being put through its paces. These and more were what greeted me as I arrived at the 8th Annual Maryland Helicopter Association (MHA) Fun Fly.

Inverted formation hovers; what fun! That's Kent Wien's Hirobo Tsurugi in the foreground and Albert Santiago's Ergo .60 Sport sharing center stage.

Alberet Santiago's Ergo 60 executes an tail-first, inverted departure. Note the position of the exhaust plume.

This year's venue was the Patuxent River Park—a very open and great place for flying helis. CD Kerry Cochrell and his team did a splendid job of running the show, and 55 registered pilots had a great time. There were fun events for pilots to test their skills and plenty of time for open flying. A large raffle with many great giveaways added to the fun; prizes included a helicopter kit and a new heli radio. All registered pilots went home with something. Another plus was a "clinic" of sorts for pilots who needed help with helicopter setup or wanted answers to heli questions.

One person who used this help was 15-year-old Jon Simon, who showed up on Sunday. Jon won the heli radio and then, with the help provided by resident expert Philip Clausen, installed it in his LMH heli. Jon was having trouble with his old radio system, so this sure was great timing. To make the occasion even more interesting, some fun events were held for three skill levels. Plaques were awarded for the first three places in each level.

The MHA had another successful event, and all the pilots who came had fun. Hope to see you there next year!

Phil Clausen brought along this great-looking Mas Quicksilver.

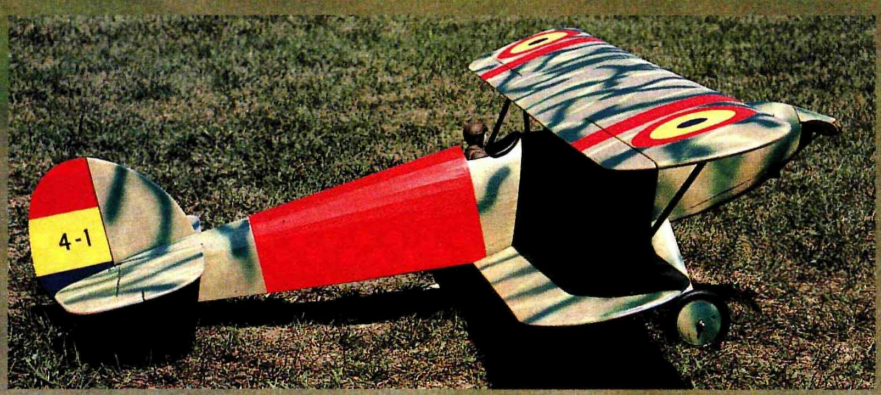
WINNERS
(first through third)

- Novice: Mike Harlow, Randy Kleinert, Clark Cramer.
- Intermediate: Mike Knorowski, Greg Totten, Dan Monroe.
- Advanced: Chuck Wildey, Jamie Edwards, Kent Wien.

Congrats to all the winners!

Kyosho representative Steve Poretz hovers his Concept 60 sporting a Jet Ranger fuselage.

The lucky winner of the Futaba 6XH radio raffle prize, Jon Simon.



Main image: Keith Shaw's new 1/4-scale Fokker DVIII weighs 13 pounds and is powered by the new MaxCim Mega motor. Top left: Les Garber flew this little cutie. It's a John Swetland design that Les powers with a 6V Speed 400 motor and seven 1400AE cells.

Bottom left: Martin Irvine's Hawker Fury is a real eye-popper. Built from Martin's own plans, it's covered with MonoKote; Martin sprayed on the camouflage and markings and then oversprayed the entire plane with a dull lacquer. Above: Doug Ward brought this Arrow to the event. It's built from 1940 Air Trails plans, and Doug flies it with a Speed 400 motor geared 5.25:1 and seven 500AR cells; 25 ounces; 392-square-inch wing area.

Keith's big Bearcat takes off during another aerobatics demo.

Mid-America Electric Fly

Keith and Ken throw a *quiet* little party...

by Larry Marshall

THE ELECTRIC FLYERS ONLY and the Ann Arbor Falcons are two groups of electrics flyers who have been around for a long time. Headed by Ken Meyers and Keith Shaw, respectively, these groups have promoted electric flight by holding an annual meet called the "Mid-America Electric Fly," which is now being held on the outskirts of Detroit, MI.

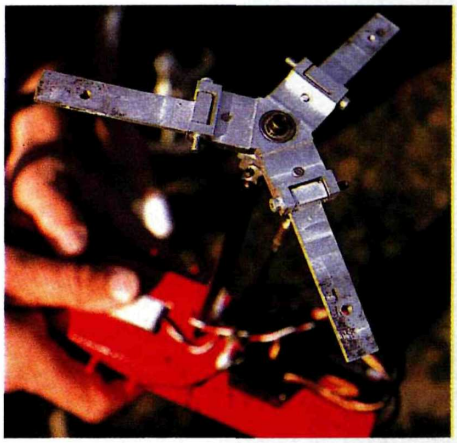
Keith and Ken know how to throw a good party. Their modus operandi is fairly simple: they provide a great site; they insist on safe flying and good frequency control ... and little else. While they do have some low-key awards for "Best Scale," "Best Jet" and the like, Keith properly puts these in perspective by saying, "Don't risk your airplane for a 50-cent plaque." Maybe most of all, Keith and Ken understand electrics flyers, so bullhorns and PA systems don't exist at their meet, leaving the flying field quiet, as we electrics flyers have come to enjoy.

Of course, there is also food—a great barbecue on the field; nothing fancy, but good and plentiful. Best of all, when you've finished eating, you can go back to flying.

And fly we did; in fact, after the banquet, we flew until the sun went down, and many of the guys simply switched planes and spent the next few hours flying in the dark with lighted airplanes. Electric power is ideal for this, as a flip of the switch starts the motor, and there's little in the way of field equipment to get lost in the dark. Many power their lights off the motor battery, so no setup is required

PHOTOS BY LARRY MARSHALL

either. Some people simply tape cyalumes to their wings and tail. Doug Ingraham did this with his Hobby Lobby* Timothy and then passed the box around for others to try. Jim Ryan has a bunch of lights stuffed inside his Clancy* Lazy Bee, and in flight, it looks something like a Chinese lantern. Ralph Weaver flies a Hobby Lobby Bleriot—an indoor flyer that's ideal outdoors when the wind is down. The plane has running lights and a small strobe, and it looks great in the air. Using some of the new lithium cells, Ralph gets 40 minutes of flight

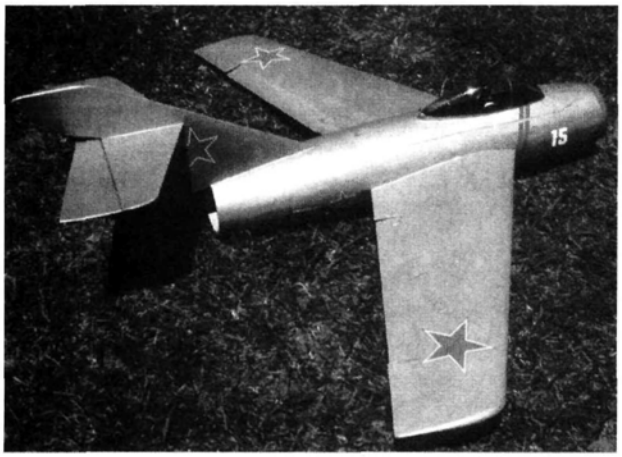


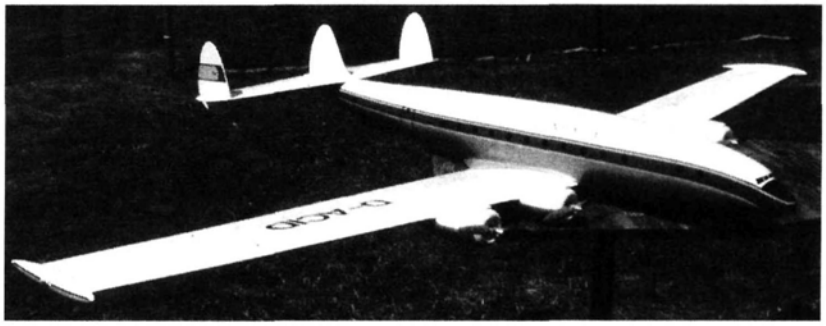
Above: Les Garber hand-made the head for his autogyro. It works really well and had many wondering whether they should give autogyros a try. Top left: this Robbe DH-7 is beautiful in the air. Powered by four Speed 400 motors, it's a solid flyer. Center left: Chris True took one of the new Kyosho T-33s and modified it, using an FAI035 and 12, 1250mAh cells for power; he rounded and smoothed the inlets and outlet. This plane really scoots. Left: Jack Sowle converted this Goldberg Sukhoi to electric using a MaxCim motor for power. Below: Dave Grife's new Fokker DVIII was built from a Proctor kit. At 24 pounds, it flies using an Astro FAI60 on 36 cells.

Mark Wolfe's Corsair finishes a strafing run of the Mid-America field.

time, so he, too, passed his transmitter around so others could give it a try.

During the day, the sky was filled with airplanes. Keith debuted his new ¼-scale Fokker DVIII, putting in its first flight during the event's "setup day." It's powered by one of the new MaxCim* mega-motors and 30 cells; the plane weighs 13 pounds. I was lucky enough to see the first flight, and as Keith inched the throttle forward, we all held our breath in anticipation. But before he got to half throttle, the plane had jumped off the ground and was flying away as pretty as you please. Keith isn't a shy pilot, and before we knew it, he was doing Cuban-8s, loops and rolls. At one point, he pulled it up and did a torque roll. I think it's



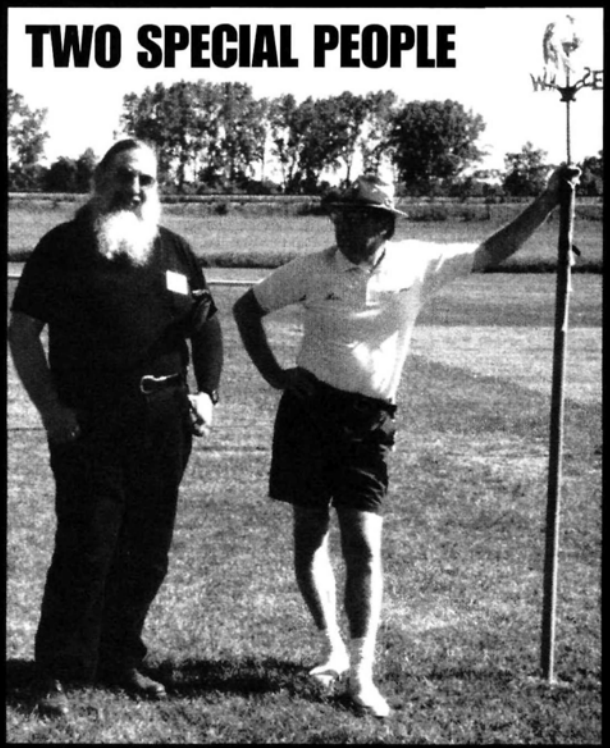


Left: Chris True scratch-built this MiG-15. Powered by a Wemotec 480 fan, Astro FA1035 motor and 10, 1250mAh cells, it is the most impressive small electric jet I've seen fly. Above: Andy Fok of Unbeaten Path Imports brought this Connie. What a plane! He let me fly it, and it's rock-solid, just as a Constellation should be. Landing was a breeze.

TWO SPECIAL PEOPLE

Today, electric-powered aircraft seem to be everywhere, and being able to find an experienced electrics flyer to ask questions of is becoming a somewhat easier task. More information is also available through various model publications, including *Model Airplane News*.

But it wasn't always this way. Even as recently as 1991, when I became interested in electric flight, electrics fliers were few and far between. To be successful meant traveling to faraway meets to see and talk with other electrics fliers. One of the first big electric meets I attended was Mid-America. I learned a lot, and while I owe a great many thanks to all the guys who willingly answered my steady stream of questions, the two who go so far out of their way every year to hold this event will always be special to me. I feel privileged to call them friends.



Keith (left) and Ken (right) are pillars of the electrics community. We owe them much for their passion for helping other people have a good time with electric-powered models.

Ken Meyers is an elementary school teacher and a dedicated modeler who has been building and flying models since the '50s. He entered electric flight in the early '80s, back when AstroFlight sold ferrite motors and the commonplace use of peak-detect charging was in the future. Ken is also the editor of the "Ampeer," the newsletter of the Electric Flyers Only club. Many of us who weren't club members subscribed to this newsletter because it contained a lot of useful information. These days, I read it on Ken's great website: http://members.aol.com/kmyersefo/homepage.htm—which is dedicated to electric flight.

Most consider Keith Shaw to be the guru of gurus in electric flight. He has been widely published on the subject and even more widely quoted. By example, he has convinced us that flying big, fast electrics is possible, and he has shown us how. Most descriptions of Keith explain that he's a physicist at the University of Michigan—in an attempt, I suppose, to let people know where he gained some of his expertise in electric power and model design. But Keith has many years in the hobby, and most of his abilities have come from the "been there; done that" school of modeling. Keith is genuinely dedicated to the promotion of model aviation and electric flight and flies many R/C demos at full-scale airshows every year. He also loves glow engines and is an avid Zappa fan, and one of his favorite movies is "Tank Girl."

fortunate that the Germans of WW I didn't have MaxCim producing their motors.

Dave Grife flew his new Fokker DVII. Built from a Proctor* kit, it weighs 24 pounds with an AstroFlight* FAI 60, a Superbox and 36 cells. It flies "as good as it looks," though Dave is searching for the right prop to make it purr as well as he'd like.

Another plane shown off at this year's meet was Jim Ryan's Speed 400-powered Bearcat (see this month's construction article for more details). What a sweetheart this plane is. Jim let me fly it, and I felt that it flies even better than his Hellcat in that it seems to track better and it's more stable in inverted flight. It continues to amaze me how much fun these small, simple warbirds are. Jim should have kits available soon.

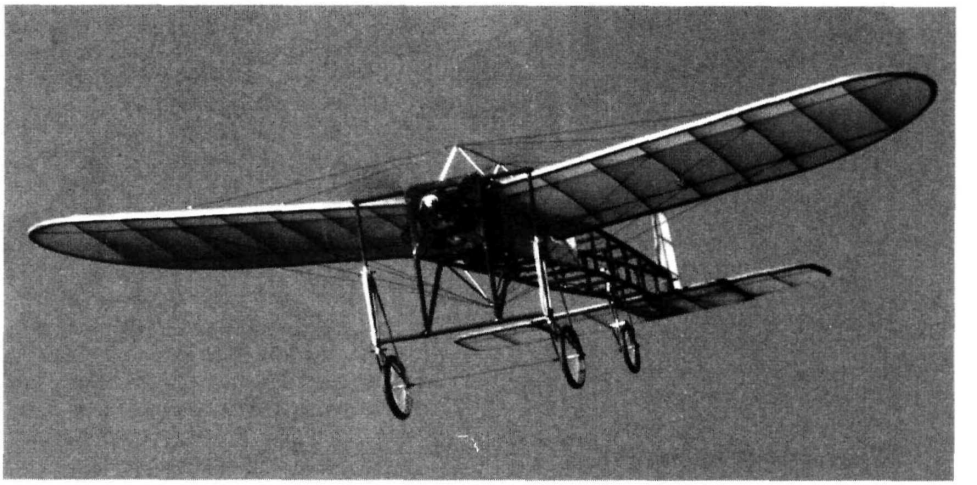
Chris True's jets were a highlight. He has scratch-built a small MiG-15 that he powers with a slightly modified Wemotec* fan and an Astro FAI 035. He has similar power in his Kyosho* T-33, though he uses the supplied fan with that one. Both of them really get up and scoot, as he uses 10, Sanyo 1250mAh cells, and the 035s really hum.

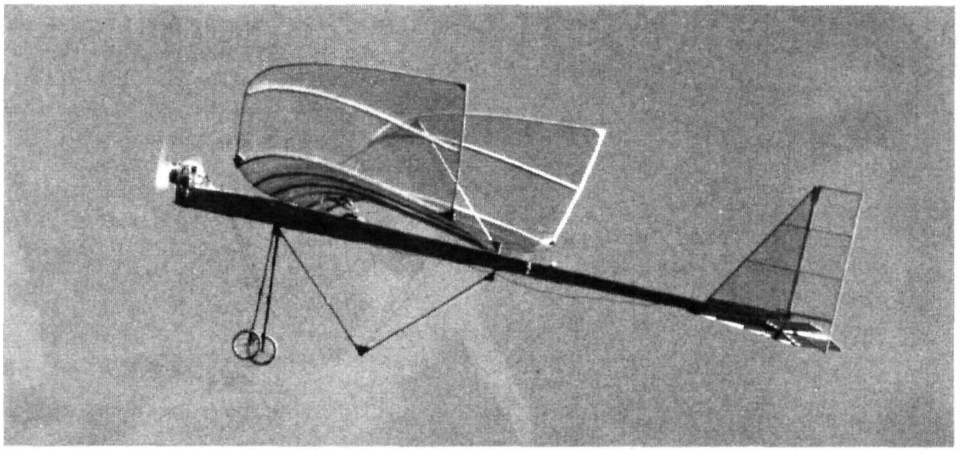
And speaking of Kyosho T-33s, this simply has to be the model of the year in the electrics community. There were a couple of stock versions of this plane at the meet, and they fly great. This plane is the talk of the town, and I'm sure we'll be seeing a lot of them.

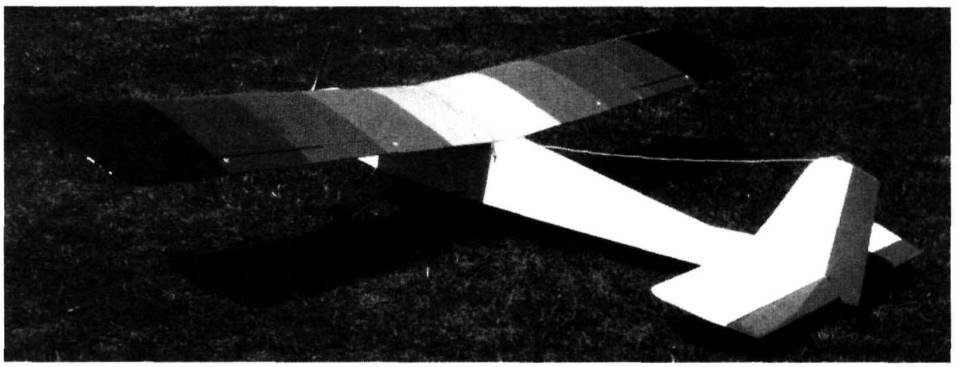
But electrics aren't all about big planes and high performance. One of the prettiest planes I saw was Les Garber's Bleriot. He powers it with a Leisure* 05 with 3:1 gearbox and seven 1400mAh cells. At 30 ounces, this beautiful flying machine with all its flying wires was simply stunning in flight. He also flew an 18-ounce autogyro using a Speed 400 motor and seven 500mAh cells.

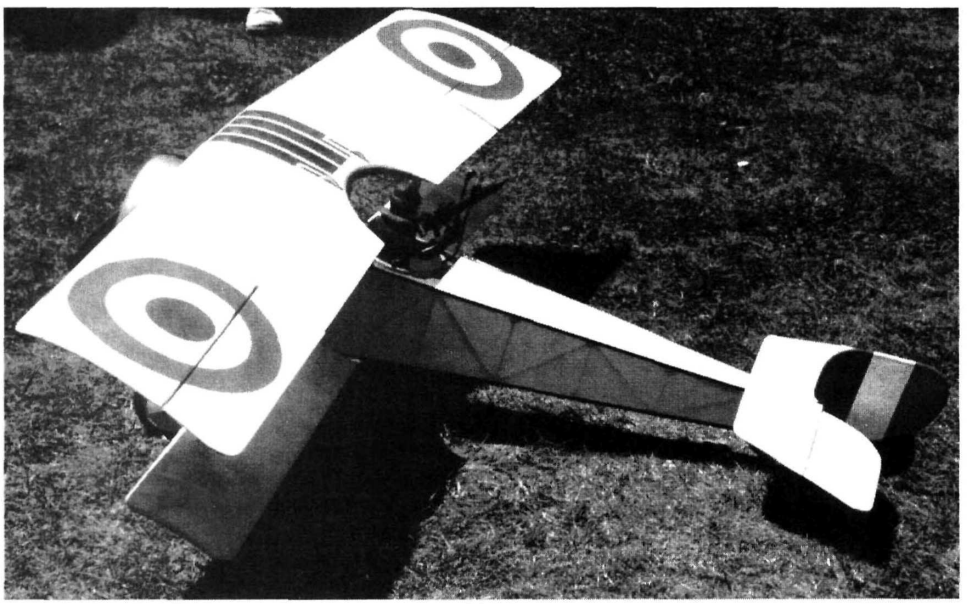
I've attended a lot of electrics events over the last few years, and none comes close to providing such a high-quality flying and social experience as does Mid-America. Maybe more important, Keith and Ken seem to be able to make it better every year. It's truly becoming "the event" in the minds of a growing number of electrics flyers. If you fly electrics, you might consider setting aside some time in July '99 to attend Mid-America.

Addresses are listed alphabetically in the Index of Manufacturers on page 174.









Top right: Les Garber's Bleriot was a big hit. At 450 square inches of wing, it weighs only 30 ounces with a Leisure Texaco 05 geared 3:1 and seven 1400AE cells. Center right: "indoor" R/C is taking off (pun intended) in North America. Interestingly, most of it seems to be happening early in the morning or late in the evening when the winds die down. Right: John Kauk flew this 10-pound Senior Telemaster with a MaxCim Y-wind motor and 20 cells. Below: Martin Irvine's Nieuport 12 flies "as good as it looks."

Scale R/C Combat

WESTERN NATIONAL CHAMPIONSHIPS

by Doug Haacke

Left: a study in concentration: third-place finisher Mark Martin of Sidney, MT, maneuvers for position, along with eight other pilots. Main image: a Mustang is on short final after a long sortie. Most scale combat planes do without landing gear to save weight and drag.

THE FIRST ATTACK came shortly after dawn. The fighter pilots were, of course, expecting the onslaught, but the anticipation of the coming battle did little to calm their nerves. Many had come from far away, and they stood ready, their faces scanning the skies. Some were just boys, giddy for action, jabbering impatiently. The seasoned veterans were quietly checking their equipment—watching, listening and preparing for battle. Their planes, in great numbers, stood ready—dressed up and decked out. Many would be lost this day.

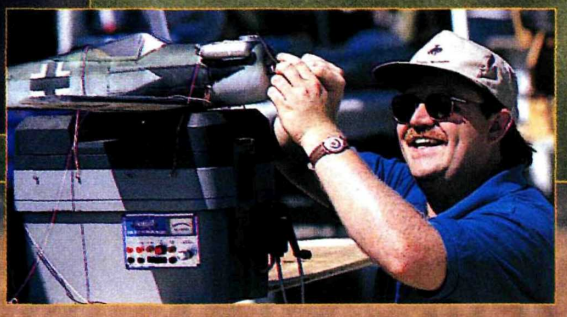
"Break right; there's a bandit on your tail!"

No, this isn't the start of another WW II novel. This was the scene moments before the 1998 Scale R/C Combat Western National Championships in Billings, MT, where 48 fighter pilots competed in the richest scale combat event in the world!

The abundance of pilots ensured that each competitor would have plenty of bogeys to watch for. And if that wasn't enough, the very hot weather was coupled with strong, gusty winds. On the first day of competition, only three rounds with six combat heats were flown. The rest of the day's activities were canceled because of extremely high winds, rain, hail and lightning. The following day was a beauty, and a full six rounds were flown for a total of 54 sorties. Most heats (or sorties) had eight planes competing at one time.

RULES OF THE GAME

For those who may be new to scale combat, I'll recap the rules very briefly. First, you build a 1/12-scale replica of a fighter plane that was in service between 1935 and 1955. Better yet, build a couple of them! Next, tie a 30-foot-long crepe-paper streamer onto the tail of one, toss it in the air, and for seven minutes, enjoy what we think is the most fun you can have flying an R/C airplane. Your mission is to remove streamers from your



Left: Jeff Weiss of Sacramento, CA, prepares to land with his beautifully painted Iraqi Sea Fury. Jeff brought more than a dozen gorgeous planes to the event. Below: Kurt Ziegler of Madison, WI, is a typical combat pilot: always smiling! Bottom: Walt "Sgt. Schultz" McIntosh comes home after a sortie. Points are awarded for protecting your streamer from the enemy.

PHOTOS BY DOUG HAACKE

The fighter pilots and some of the planes at the Scale R/C Combat Western National Championships.

opponents' airplanes while trying to keep your streamer intact. Additional points can be scored for launching on time, flying the full seven minutes and for every foot of streamer you return with. Some events even provide points for a spot landing at the end of the sortie (or what we fighter pilots call a successful carrier landing).

Now, I imagine that most of you have put two and two together and are thinking, "You put a bunch of fast little fighters together, all chasing one another, and I bet you see a few midairs!" You're right; midairs do occur, but these planes are light, inexpensive and easy to build. Just as you probably don't go to the field with only one glow plug, so most fighter pilots don't enter a combat meet with only one plane. In fact, more than 250 planes were brought to this event! The models ranged from a venerable P-51 Mustang to the more bizarre, like a tiny Heinkel 100 and a huge Blackburn Firebrand.

Scott Anderson of Eden Prairie, MN, prepares his all-foam Corsair for a catapult launch. Below, he gives a launch for Bryan Hesse's Jug. Despite its size, the P-47 is very competitive.

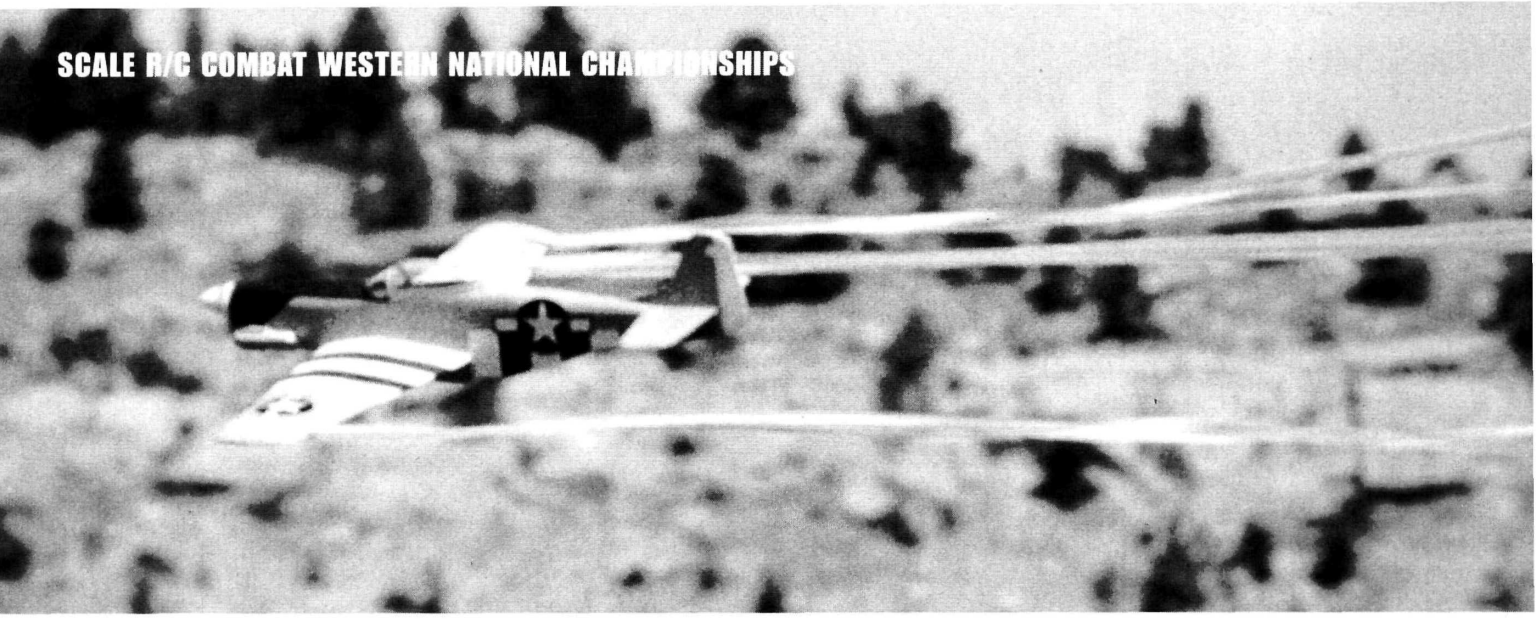
WINNING THE BATTLE

Let me tell you what it takes to do well in a scale combat meet. First and foremost, you must be prepared. Bring several planes, all test-flown and dialed in just the way you want 'em. A plane that's difficult to launch and fly has no business flying in a combat meet. A reliable, easy-to-start engine and some spare parts can make a difference. And, of course, practice is always a good idea.

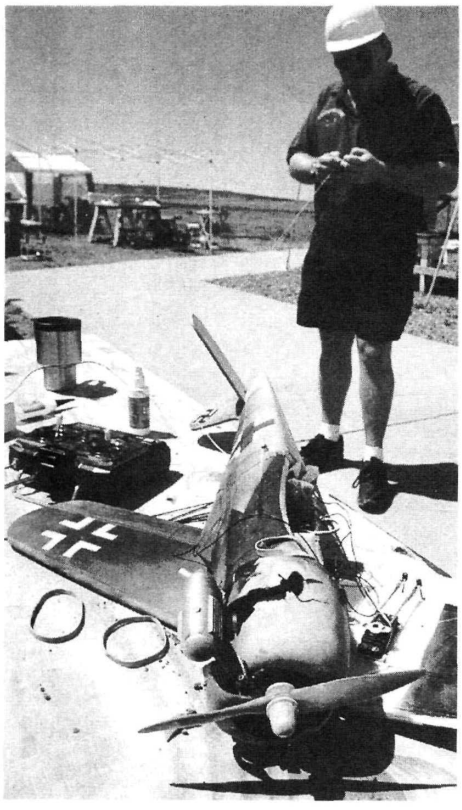
Last year, veteran combat pilot Earl Seaholm of Billings, MT, won the event with some incredible flying in the last minutes of competition. Of course, everyone came back this year gunning for the

WHEN PLANES ATTACK

In addition to being the primary purse sponsor, D'Best Co. hired several professional camera operators who shot over 30 hours of footage of the event. The finished video, "When Airplanes Attack," is packed with action footage, including launching, landing, dogfights, streamer cuts (kills) and, of course, plenty of midairs. Also included are interviews with many of the founders of the ASDA and other pilots. The high-quality video with stereo soundtrack is available from D'Best Co., 319 Yellowstone Ave., Billings, MT 59101, (406) 248-8127, for $26.95 plus $5 shipping in the U.S., or via email at DBEST@wtp.net. A portion of all sales income goes toward supporting the Scale R/C Combat Western National Championships.



big Swede, and even with the whole field on his six, he managed to take eighth place. What many didn't know was that Earl's son A.J. "Age" Seaholm had also entered with a few scratch-built Mustangs, and while everyone was busy trying to settle scores from previous sorties, this talented 20-year-old college student began collecting streamers. It wasn't uncommon to see A.J.'s Mustang carrying four or five streamers during a sortie. At times, his plane looked more like a mop than a fighter plane. A.J.'s quick reflexes, great flying plane and superb calling by his dad earned him Top Gun honors for the event.



Combat is a contact sport! Kurt Ziegler lost five planes in midairs. Kurt is a seasoned pilot and a great competitor, and he brought plenty of planes!

WINNERS

FINISH	NAME	FROM	AIRCRAFT FLOWN
1	A.J. Seaholm	Billings, MT	Scratch-built Hergett Mustang*
2	Dave Wagensomer	Harper Woods, MI	Scratch-built Hawker Sea Fury
3	Mark Martin	Sidney, MT	Scratch-built Hergett Mustang
4	Doug Haacke	Billings, MT	Scratch-built Hergett Mustang
5	Kurt Ziegler	Madison, WI	Zigg's Zeros, FW-190
6	Wayne Van Orden	Blackfoot, ID	DBW P-39, DBW Oscar
7	Jerod Sebring	Pocatello, ID	Scratch-built AT-6, DBW P-39
8	Earl Seaholm	Billings, MT	Scratch-built Hergett Mustang
9	Mark McCool	Nashotah, WI	Scratch-built FW-190 and He100
10	Pat Kenney	Billings, MT	Scratch-built P-47, Ta-152 and FW-190D9

** Plans for the Hergett Mustang and many other designs are available for free download from the ASDA website at www.scalecombat.com.*

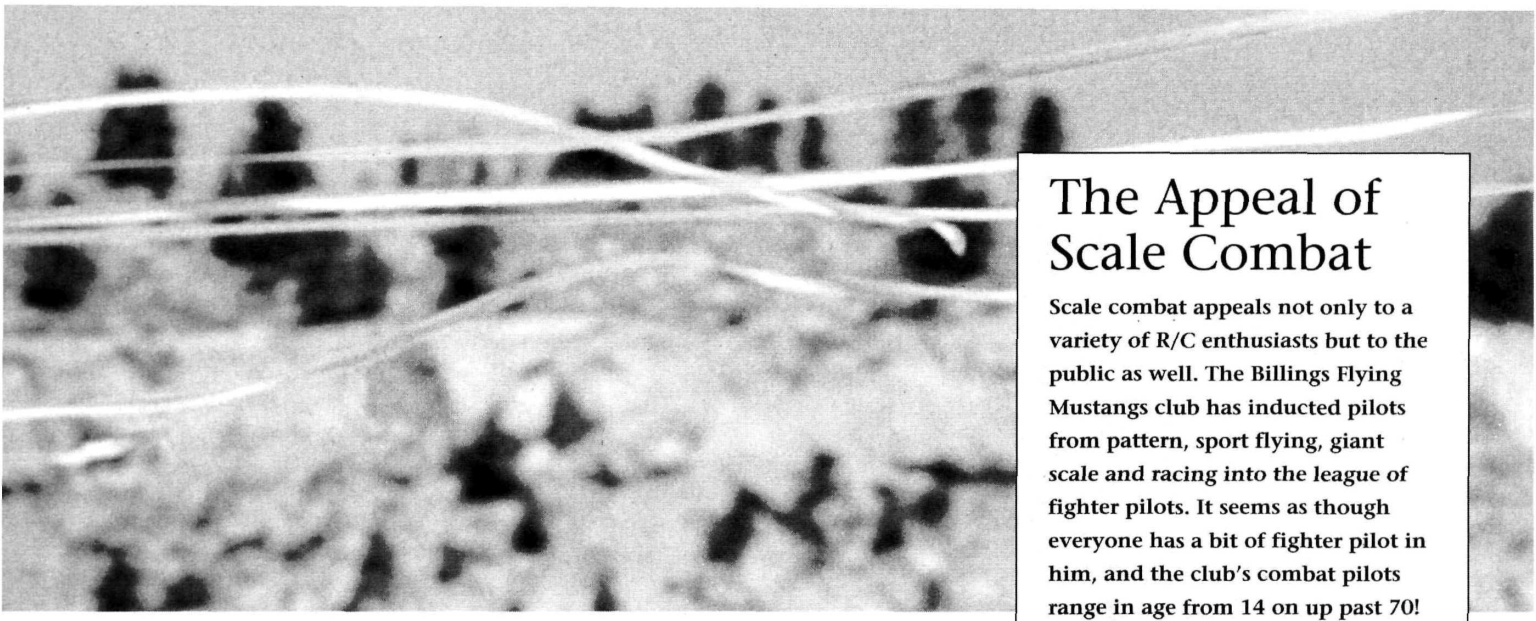
In second place, longtime scale combat advocate Dave Wagensomer of Harper Woods, MI, flew like a madman. Dave brought a fleet of beautiful Hawker Sea Furys scratch-built from his own plans. His big planes were frequently seen toting a few extra streamers around the sky.

First-timer Mark Martin of Sidney, MT, finished third, flying a Mustang and a Cub. "A Cub," you say? Actually, it was a Piper L-4, and it was very competitive.

Your author finished fourth, also flying a Mustang, adding new meaning to the expression that even a blind pig can find a turnip now and then. Actually, I had a great plane, a good caller and a healthy dose of luck.

Kurt Ziegler, owner of Zigg's Originals*, flew his fine, all-foam kits to fifth place. Kurt is an experienced and enthusiastic competitor, and his aggressive flying earned him the distinction of having the most midairs for the weekend: five!

Sixth and seventh places went to a pair of top pilots from Idaho: Wayne Van Orden and Jerod Sebring. Both were flying DBW* kit models, which are some of the fastest and most maneuverable combat planes I've seen to date. Both guys build gorgeous airplanes and know how to fly them, too.

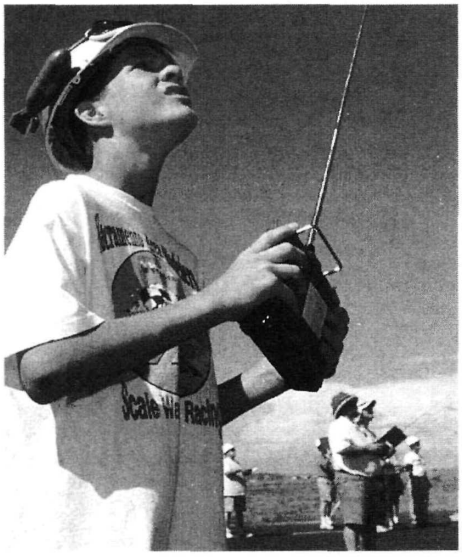


Above: this is why A.J. Seaholm won the event: he flew several rounds where he did a "hat trick" or better. Try flying a plane with all that drag!

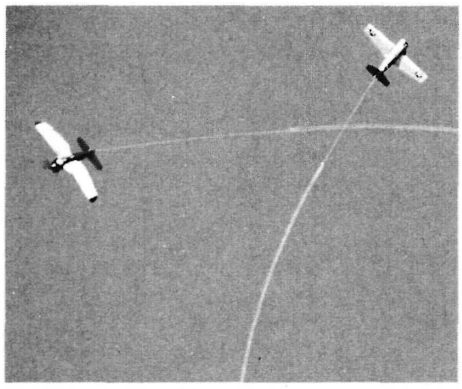
Mark McCool of Nashotah, WI, flew his stable of Fw-190s and even found time to fly his unusual Heinkel 100 (which has only a 31-inch wingspan) to ninth place. Mark lost his entire fleet of six planes only two weeks before the meet, yet he managed to crank out another half dozen just in time for Billings.

In 10th place was Pat Kenney, who had only a half dozen kills, but whose great flying, reliable performance and good defense helped him rack up points. Pat flew the peculiar Focke-Wulf Ta-152, which has a high-aspect-ratio wingspan of 47 inches. This plane trolls for streamers!

I should also mention that only 22 points behind 10th place was one of our younger fighter pilots, 14-year-old Kevin Crandall, who made his first appearance in Billings this year and who will definitely be one to watch out for next year! Pilots ranged in age from 14 to 72; this is most definitely a sport for all ages.



Kevin Crandall of Irvine, CA, was one of our youngest pilots. Kevin did an outstanding job and finished 11th among 48 seasoned veterans.



Mike Fredrick's Wildcat narrowly misses a kill on Scott Anderson's Corsair.

A CLASS ACT

It's just not possible to have an event of this size without support. The Billings Flying Mustangs hosted the event at their fine flying field; D'Best Co. of Billings, MT, provided all the purse money; and Airtronics* gave radios to the top five finishers. AirKill Products*, Zigg's Originals, DBW Models and K&A Models* donated kits, and Ron Daniels Designs* offered a $100 bonus to pilots who won while flying planes made from its plans. MVVS Engines* provided several high-performance engines, and Check Six Plans* donated a host of plans that many top finishers will be using this winter. A huge thank you to all the sponsors, including Pepsi, KTVQ, Deaconess Hospital and the "Billings Gazette" for making this the biggest scale R/C combat event of the year.

Want to know more about scale R/C combat? The American Scale Dogfighters Association (ASDA) is dedicated to the safety, growth and continuity of this exciting sport. For more information, visit our website at www.scalecombat.com or write to ASDA, 20300 Lochmoor, Harper Woods, MI, 48225.

**Addresses are listed alphabetically in the Index of Manufacturers on page 174.*

The Appeal of Scale Combat

Scale combat appeals not only to a variety of R/C enthusiasts but to the public as well. The Billings Flying Mustangs club has inducted pilots from pattern, sport flying, giant scale and racing into the league of fighter pilots. It seems as though everyone has a bit of fighter pilot in him, and the club's combat pilots range in age from 14 on up past 70!

Part of this broad appeal is the low cost of getting started and staying involved. Pattern flyers and giant-scalers find building and flying airplanes that cost less than $100 a refreshing break, as you can build a half dozen combat planes for the cost of a good set of retracts. Sport flyers like the relaxed and often hilarious nature of combat competition, and racers enjoy tweaking their WW II designs to get the most from their aircraft. Novice pilots find that combat planes make good second or third airplanes and have little trouble moving up to these smaller fighters. Even old-timers find that because the planes are not flown at a great distance, visibility is not an issue, and they enjoy reliving the history of scale WW II combat.

Contest directors and club officers will be delighted to learn that the public absolutely loves to attend combat events. The Scale R/C Combat Western National Championships is the Flying Mustang's largest fundraising event of the year. With nonstop action, great visibility and just enough midairs, crowds stay all day soaking up the fun, spending dollars at the concession stand and, most important, generating an interest in our wonderful hobby. Without a doubt, combat has done more for the Flying Mustangs than any other recent event or activity we've offered. If your club isn't already active in scale combat, why not consider an event for next year?

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

GLOBAL QUALITY KITS TEQUILA SUN

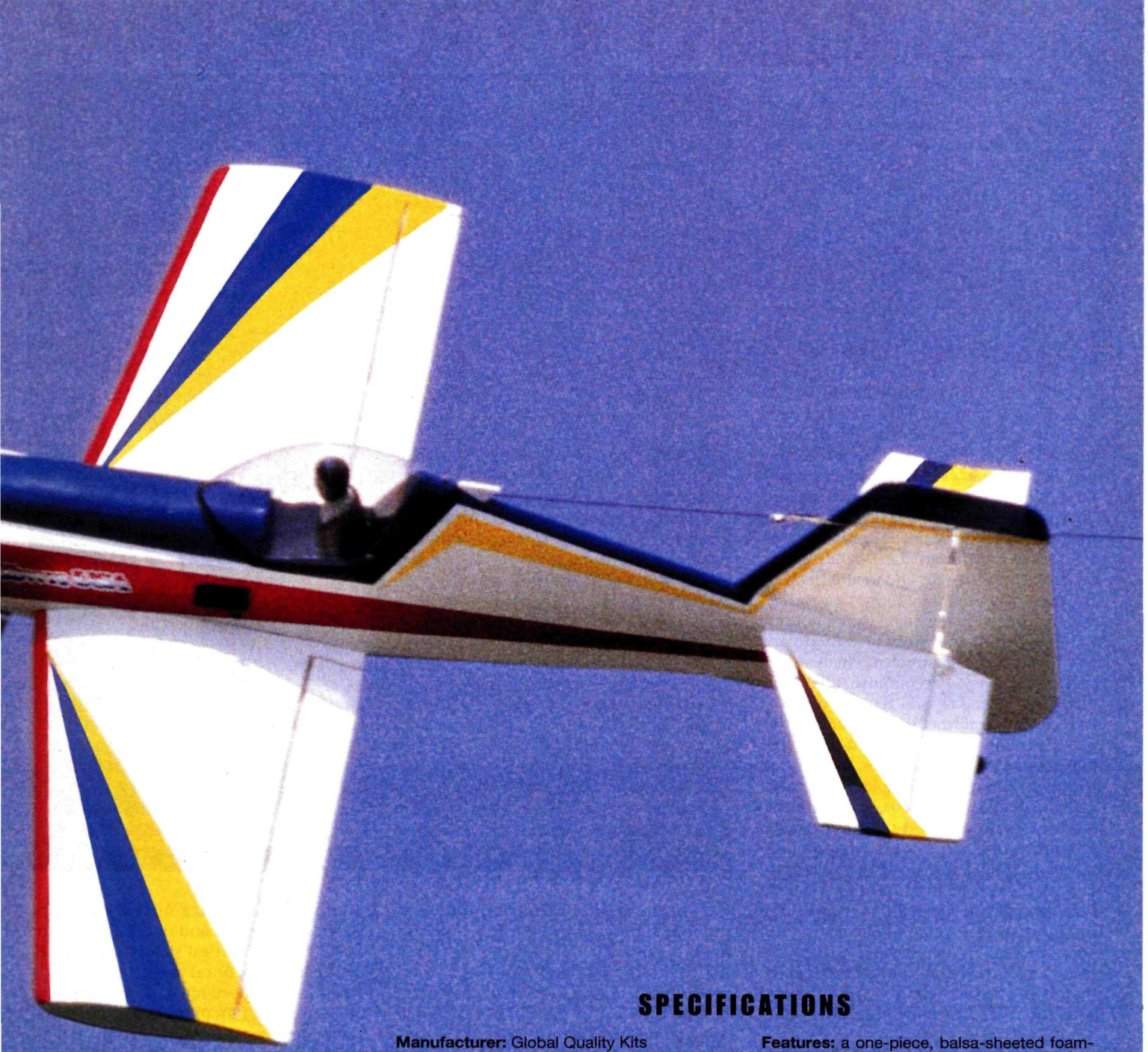
by CRAIG TRACHTEN

THE GLOBAL* QUALITY KITS Tequila Sunrise is a .25-size, sport ARF aircraft that features lightweight wood construction and doesn't take a lot of time to assemble.

Spice up the field with this .25-size ARF

The model also comes covered with attractive polyester film, and the kit includes all necessary parts and hardware. At the field, the Sunrise was born for speed and can handle any aerobatics maneuver in the book.

A .25 engine provided more than enough power for the Tequila Sunrise; in fact, I think it would also fly well on a .20.



RISE

SPECIFICATIONS

Manufacturer: Global Quality Kits

Model name: Tequila Sunrise

Model type: sport ARF

Length: 35.5 in.

Wingspan: 36 in.

Wing area: 288 sq. in.

Weight: 3 lb., 9 oz.

Wing loading: 28.5 oz./sq. ft.

Engine required: .25 to .28 2-stroke

Engine used: O.S. .25 FX

Prop used: APC 8x6

No. of channels req'd: 4 (throttle, rudder, elevator, aileron)

Radio used: FMA Tetra receiver, FMA servos, Futaba 6VA transmitter

Fuel: Omega 15-percent nitro

List Price: $99.99

Features: a one-piece, balsa-sheeted foam-core wing, painted fiberglass cowl and polyester film covering. The model accepts standard radio gear.

Comments: The Global Tequila Sunrise is the ultimate back-seat aircraft. You can leave it there assembled and ready for flight, just in case you have a break and want to drive to the flying field. I fly mine most of the time on a high school football field while my wife runs the track around the perimeter of the field. She exercises her heart and legs; I exercise my heart and thumbs. To each his own!

HITS

- Well built and covered.
- Extremely agile flier.
- Very transportable.

MISSES

- As with all ARFs I have built, the supplied wheels are too small to fly off grass.

WING AND TAIL ASSEMBLY

You need only to install the ailerons, servo and control linkages on the one-piece wing. The ailerons come attached to the wing but are not secured. Take them off and rough up the gluing surface of the hinges. Lightly oil or apply petroleum jelly to the hinge joints. Place a piece of waxed paper behind the aileron torque rod to avoid gluing the aileron to the wing. The instructions call for 30-minute epoxy to secure the hinges, but I used 2-hour epoxy. Not only is it stronger, but it also flows better. To install the hinges, I V-trim the hinge slot surface, apply epoxy to the slots, take a piece of scrap wood and work the epoxy into the slot, then insert the hinges. I have found that this method reduces ooze and, hence, cleanup. It also provides a narrower gap between the wing and the control surface. When the epoxy has cured, secure your servo to the pre-installed hardwood mount. Thread the supplied control tabs to the torque rods, insert the Z-bends of the pushrods into the tabs and secure them to the servo control arms.

Now epoxy a screw plate to the bottom trailing edge of the wing. Measure, mark and re-measure as instructed. There are no tricks or secrets to accomplish this. Now grab your razor saw and remove the bottom of the rear former so it will accommodate the wing control tabs and pushrods. Mark a centerline on the rear bulkhead (the wing mount). Now place the wing into the saddle; it should be flush with the saddle. Do any necessary trimming now. The drill hole mark on the wing-mounting plate should line up with the centerline on the rear bulkhead. Drill a 5/32-inch hole through the wing and plywood plate in the fuselage. Remove the wing and open the hole in the plywood plate to 7/32 inch. Install the supplied blind nut and reinstall the wing. When you are happy with the fit and alignment, CA the blind nut into place.

The horizontal and vertical stabilizers are attached as they are in just about every other ARF on the market. Trial-fit the horizontal stab and make sure that it is parallel with the wing. Scribe a line at each of the four surfaces where the fuse and stab meet. Remove the stab, remove the covering where the fuse and stab touch, then epoxy them together. After the assembly has dried, epoxy in the elevator the same way you did the ailerons. Trial-fit the vertical stabilizer and draw a line on each side where it meets the fuse. Remove the stab, then remove the covering material below this line. Here again, as with the ailerons, I minimize ooze by putting epoxy into the slot and not onto the part. Make sure the vertical stab is perpendicular to the horizontal stab. To do this, I take a long piece of low-tack masking tape and run it from tip to tip of the horizontal stabilizer, over the vertical stab. I then check to make sure the two stabilizers are square. When satisfied with the alignment, I press the tape that's on top of the vertical stab so it won't shift during drying. Assemble the tailwheel as instructed, epoxy the rudder to the vertical stabilizer (just as you did with the ailerons), and the empennage is complete.

FLIGHT PERFORMANCE

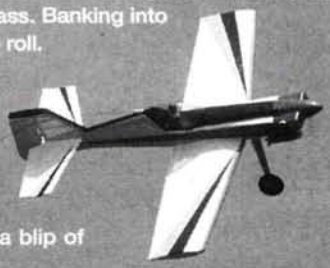
Every aircraft should be checked before flight, but a new one gets the super-duper once-over at the field. All systems were good to go, and with the O.S.* .25FX spinning an APC* 8x6 prop, we had to hang on hard when we ran up the engine.

• TAKEOFF AND LANDING

As expected, the Tequila Sunrise had no problem getting off the ground. On rotation, the wings wobbled a bit but not drastically. Climb-out was no problem and at altitude, some minor trim was needed for straight and level flight. Landings were cake. As soon as the model was over the outer marker and about four feet off the ground, I chopped the throttle and the aircraft just settled to the ground. Simulating, as best I could, dead-stick landings produced two different results. A straight-in dead-stick is no problem. Turning to reach the field dead-stick may pose a problem. If you are too low to dive to the ground and build up air speed before you start the turn, be cautious. You might consider flying the model straight ahead and heading for some high grass. Banking into a turn without enough air speed will cause a diving snap roll.

• LOW-SPEED PERFORMANCE

I was pleasantly surprised at the Tequila's low-speed handling. Stalling the aircraft from level flight caused the nose to dip and the left wing to drop. It happens fast, but not violently. Recovery is not as difficult as it is with other aircraft of this ilk. Power, elevator and a blip of aileron put the model back on track.

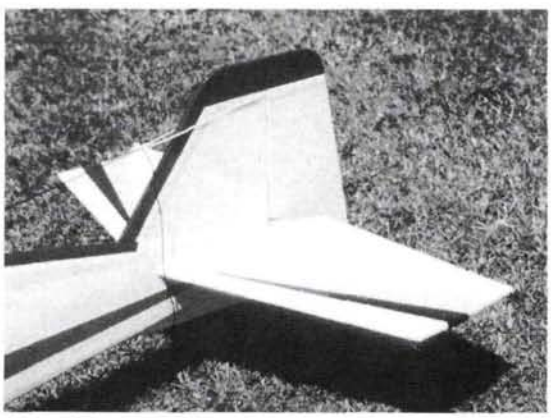


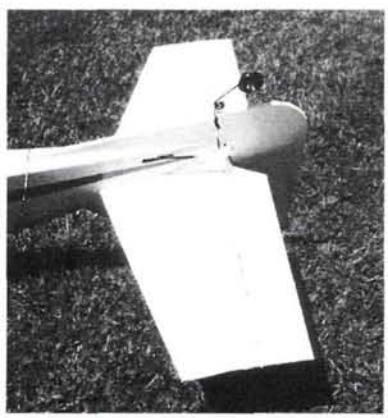
• HIGH-SPEED PERFORMANCE

The Tequila Sunrise was born for speed. On high rates, it was almost too sensitive. I was more comfortable flying on low rates most of the time. The fact that I used a .25 FX added to the excitement; you might even say I over-powered the aircraft. The Sunrise would be a hoot and a holler with a .20. From 1/2 to full throttle, trim adjustment was not necessary to maintain level flight. If you're not careful, the Sunrise will travel off into the sunset in a heartbeat, so don't let it get away from you.

• AEROBATICS

How good are you? The Tequila will do whatever you are capable of and then some. Rolls, loops, knife-edge, inverted, avalanche—you name it, the Tequila Sunrise does it well.





Above left: the horizontal and vertical tail surfaces fit together without any fuss. Above right: a steerable tailwheel (included) helps ground handling.

MAIN GEAR AND ENGINE INSTALLATION

The main gear is attached to the fuselage with two bolts and washers. No marking or drilling is necessary. When the gear is in place, trial-fit the landing-gear cover plate. You might have to do some trimming to provide room for the bolt heads. I did not trim the plate outside dimensions and left it a very snug fit. The instructions call for a few dabs of epoxy to hold the cover plate in place so it can be removed later if necessary. I used one dab of clear

silicone on each side because it's easier to cut through silicone than epoxy.

I saved myself some time and aggravation when I mounted the wheels. I fly off of grass fields, and I thought the supplied wheels were just too small for grass. I replaced them with Du-Bro* 2.75-inch Lite Wheels and left off the supplied wheel pants.

Attach the supplied engine mount to the firewall with the four supplied machine screws. Place your engine in the mount and check for proper fit. When you're satisfied, mark the engine-mounting holes, making sure that the thrust washer is 4 inches in front of the firewall. This will ensure that the cowl fits properly. The instructions call for sheet-metal screws to attach the engine to the mount. I prefer to drill through the mount and use bolts and locknuts.

To install the cowl, I first remove the engine needle, head, muffler and anything else that might obstruct proper placement. I then attach the cowl to the fuselage with masking tape. A thin machinist's rule or long, thin strips of paper will come in handy. Start by marking the positions of your cutouts with a permanent-ink marker. I then remove the cowl and open a small hole at each of my marks. Re-install the cowl, attaching it with the masking tape, and check that each hole is "centered" and in the proper position. I mark any needed adjustments and outline the openings on the inside of the cowl. Now I cut out the holes with a Dremel no. 121 high-speed cutter and a no. 430 drum sander. Put the engine parts back together and secure the cowl with four screws. Note: don't re-install the high-speed needle until the cowl is secure.

ODDS AND ENDS

Servo and pushrod installation is an easy task. All of the servo mounts are in place. The elevator and rudder servos are installed in a separate compartment behind the main compartment. The photos in the instructions make this a no-brainer. The distances between the servos and control surfaces are short and straight, so they're easy to connect. Make sure the servos and control surfaces are in their neutral positions before you make any connections.

To cut out the canopy, use a pair of curved scissors or a sharp modeling knife. If necessary, trim for a proper fit. The instructions call for using four small screws to hold the canopy in place. I used them, but I also ran a small bead of canopy glue around the edge for a complete seal. The supplied black trim tape completes the installation. A nice pilot bust in the cockpit will really complete the look; I used a Hangar 9* civilian pilot trimmed to fit.

The clear canopy (included), a pilot figure and supplied black trim tape add the final touches.

Take your time while balancing the Sunrise and setting the control throws; they are more critical than you think. The CG should be 2¼ inches back from the leading edge, with a ¼-inch margin forward and aft. I shifted battery position to achieve the correct CG. I set all control throws to what Global recommended. This is a case where more is not better!

FINAL THOUGHTS

The Tequila Sunrise has just taken first place as my personal back-seat aircraft, ready to fly anytime. It's the perfect plane for this honor because it's small enough to be left assembled, and it also looks good and flies well. The Sunrise will give you many enjoyable flights and a super dose of adrenaline each time.

**Addresses are listed alphabetically in the Index of Manufacturers on page 174.*

IMAC NATIONAL CHAMPIONSHIP

Top fliers go for the gold!

by Dan Wolanski

ONE YEAR AGO, Model Airplane News brought you the first major coverage of the International Miniature Aerobatic Club (IMAC) National Championship. IMAC now boasts its highest membership ever, and it seems only fitting that this magazine continue its coverage with the 1998 National Championship, held on August 21 to 23 in the birthplace of IMAC: Toledo, OH.

AT THE FIELD

Friday was set aside by contest director Tom Kroggel as a day for pilots to become accustomed to the field and expected conditions during the event. Wanting to take full advantage of the opportunity, I arrived at the field at 9 a.m. to find a huge, 600x300-foot grass runway with a tree line that parallels the runway approximately 700 feet out. Another tree line at the left end of the field promised to make end-box maneuvers quite interesting. As I put my plane together, other pilots began to arrive with planes of all sizes, from .40 to 40 percent. The day was filled with lots of flying, showing off and socializing. Pilots from around the country who had only heard of one another via newsletters or the Internet finally had a chance to meet and compete.

Saturday, the first day of competition, included two rounds of Known maneuvers. At 9 a.m., the two flightlines roared into action as the first pilot started his engine, taxied his plane out and broke ground into the hot, humid morning air. The weather could not have been more perfect with sunny skies, calm winds and temperatures expected to hit 90 by mid-afternoon.

As the morning progressed, leaders in each class began to emerge. In Sportsman, Brian Fisher quickly jumped out in front of the pack, followed by Marc Moldowan and Troy Crowe. Brian had worked very hard during the previous months and seemed to be taking the Midwest by storm. In Advanced, 1997 Sportsman national champion Mike Kuper put in a stellar first round followed closely by John Adams and me. Mike and I fly, practice and call for each other, and I was there as the Northwest regional champion. In Unlimited, IMAC president Doug Cronkhite edged out Mike McConville and Mike Cross for the early lead. Doug flew in from San Diego and borrowed Mike McConville's plane for the event. The two also called for each other. Near the end of the first round, Jerry Candito's huge, 37-percent 300L broke a wing during a negative snap and crashed.

The top finishers (left to right): John Adams, Doug Cronkhite, Mike McConville, Mark Moldowan, Brian Fisher, Mike Kuper, Jerry Candito, Dan Wolanski, Dave Genovese, Troy Crowe and Dave Pinegar.

The day ended around 4:30 p.m. with no real lead or position changes. Sportsman and Advanced tightened up with only 4.5 raw points out of nearly 6,000 possible points separating second and third places. To put this in perspective, if either of the third-place pilots had scored just a half point more on any single maneuver, they would have switched positions with the pilots who were in second place.

Unlimited did see one position change during the day, with Jerry Candito moving into third place. Jerry borrowed Wayne Mathews' plane, which

Unlimited national champion Mike McConville with his 40-percent Carden CAP.

Troy Crowe poses with his 35-percent TroyBuilt Staudacher.

Right, top to bottom: Sportsman national champion Brian Fisher with his Goldberg Sukhoi.

IMAC President Doug Cronkhite poses with a Carden 35-percent CAP 232.

Advanced National Champion Mike Kuper poses with his 33-percent Ohio CAP.

was a duplicate of his own, for the remainder of the contest and quickly shook off the crash. It was encouraging to see Jerry regain his composure and continue flying.

As everyone packed up his plane, Tom Kroggel rang the dinner bell, and we all enjoyed a wonderful chicken barbecue. Tom also handed out the next day's Unknown maneuvers, which turned out to be the 1995 Known sequences. Because most pilots hadn't been in IMAC that long or had since moved on to other classes, Tom reasoned that no one had ever flown them before. Most of the pilots I talked to were hoping for a more difficult Unknown sequence; little did they know what loomed on the horizon.

Wayne Mathews (left) and Deryck Taylor dwarfed by a Godfrey 37-percent Extra 300L.

PHOTOS BY DAN WOLANSKI

A BLUSTERY DAY

The morning began at 8:30 with a brief pilots' meeting to choose by lottery the flight order for the Unknown competition. As

IMAC Nationals Results

Sportsman

Pos.	Pilot	Plane	Weight	Prop	Engine	Radio
1	Brian Fisher	Goldberg Sukhoi	9 lb.	APC 16x8	YS 1.20AC	JR
2	Troy Crowe	35% TroyBuilt Staudacher	30 lb.	Mejlik 26x12	Brison 6.4	JR
3	Marc Moldowan	RC America CAP	15 lb.	APC 18x8	Bully Tartan	JR
4	Dennis Johnston	Midwest CAP 232	16 lb.	Bolly 19x9	Moki 1.8	Futaba
5	John Schroder	35% PMP* Extra 260	27 lb.	Menz S 26x10	3W-80	Futaba

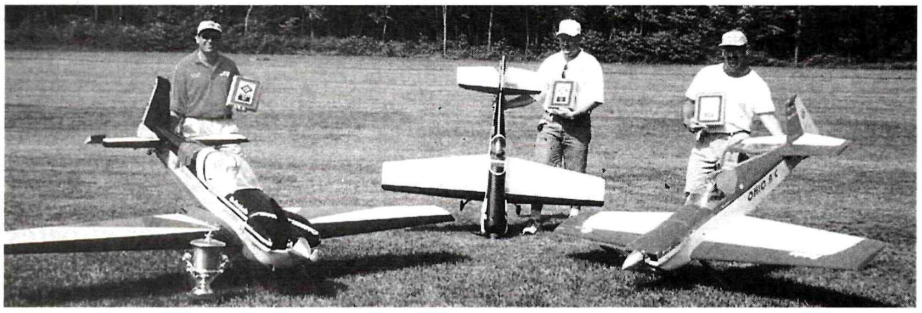
Advanced

1	Mike Kuper	33% Ohio CAP	24 lb.	Mejlik 26x12	Brison 6.4	Futaba
2	Dan Wolanski	28% PMP Extra 300S	15 lb.	Mejlik 22x10	Brison 3.2	Futaba
3	John Adams	35% Carden CAP	26 lb.	Bolly 26x10	3W 100	JR
4	Ed Alt	Midwest Extra 300S	15 lb.	Bolly 19x9	Moki 1.8	JR
5	Wayne Mathews	37% Godfrey 300L	36 lb.	Mejlik 28x12	3W 120	Futaba

Unlimited

1	Mike McConville	40% Carden CAP	38.5 lb.	Bolly 30x12	3W 140	JR
2	Doug Cronkhite	35% Carden CAP	30 lb.	Bolly 26x10	3W 100	JR
3	Jerry Candito	37% Godfrey 300L	36 lb.	Mejlik 28x12	3W 120	Futaba
4	Mike Cross	33% Aero Raven	26 lb.	Bolly 26x10	Brison 6.4	Futaba
5	Dave Pinegar	Midwest Extra 300S	15.5 lb.	Menz 20x8	Saito 300	Futaba

*Performance Model Products



First-place finishers (left to right): Mike McConville, Brian Fisher and Mike Kuper.

9 a.m. approached, the weather began to change. The wind, which had been peculiarly absent the day before, started to brew very quickly. By the time the starting gun sounded, winds were gusting from the southwest at over 20mph. Everyone watched the first pilot struggle with the wind and the new sequence. Trying to fly straight and level became a chore. Sudden downdrafts and crosswinds came off the surrounding trees, making each moment unpredictably exciting. Anyone who had wished for a harder Unknown quickly retracted his earlier comments. As the rounds began, it was evident that most pilots were just trying to get through the sequence and hoping their current position would not falter.

Sportsman saw a very tight race during the Unknowns, with John Schroder winning the round and Brian Fisher taking second. Marc Moldowan, who came into the round in second place, gave up 18 raw points and second place to Troy Crowe. Brian had accumulated enough points from the previous two rounds, however, to maintain his overall first-place position and the Sportsman national championship. In Advanced, I placed first in the Unknowns, but it wasn't enough to beat overall first-place pilot Mike Kuper. John, who came into the round a mere ½ point behind me, gave up a little ground to fourth-place Ed Alt but not enough for a position change. The first five positions in Advanced went unchanged after the Unknowns, with Mike Kuper taking the Advanced national championship.

Unlimited was a real nail biter. Doug Cronkhite led Mike McConville by a mere 8 raw points out of a possible 3,000. Doug flew first and did a great job of combating the wind. After watching Doug fly, Mike decided he needed to pull out the stops, so he switched to his Tournament of Champions plane, a 40-percent CAP 232. Mike knew the larger plane would handle the severe gusts better than the 35-percent plane Doug had just flown. Mike entered the box and flew an absolutely perfect Unknown sequence and took the round by a whopping 143.5 points to win the Unlimited national championship. Doug held on to second place while Jerry Candito edged out Mike Cross for third.

A Freestyle event was also held at the end of the contest, with seven pilots choosing to participate. Freestyle is a separate event from the compulsory Known and is designed to showcase a pilot's talent outside the normal IMAC maneuvers. Torque rolls, knife-edge snaps and power-on flat spins are just a few of the maneuvers pilots attempt during Freestyle. This year, Mike Cross, who won the 1996 Freestyle national championship, showed the audience a series of unique new maneuvers, including a flat turn with snaps. These maneuvers earned him high scores in originality, and he took home the first-place Freestyle trophy. Now Mike has two Freestyle national champion trophies on his mantel, and I am sure he is dusting off a place for another.

IT'S NOT ALL ABOUT WINNING

Now that you know about the race for the title, I want to be sure to give credit to the pilots who knew that placing in the top five was probably a long shot but who greatly enjoyed the Nationals experience anyway. These pilots included John Schroder, who moved from 10th place into fifth with a stellar performance in the Unknowns; Ed Rogala and A.J. Broviak from Midwest Products, whose enthusiasm for the sport rubs off on everyone who visits their camp; Wayne Mathews of Sew Busy Embroidery and Deryck Taylor, whose Jamaican accent and friendly demeanor are a real joy to be around. Let's not forget all the members of the Flying Tigers R/C club, who put in several tireless days of work, all for the joy of being a part of history, and CD Tom Kroggel, whose blood pressure never seemed to rise in any situation. These IMAC enthusiasts, who see the Nationals as a friendly gathering and a place to make memories, are the people who make the organization what it is today. With folks such as these, there's no doubt that IMAC will be around for another 25 years.

SPONSORS

- Airtronics
- Brison Aircraft
- Carden Aircraft
- Carl Goldberg Models
- Cermark Electronics
- D+B Engines
- Desert Aircraft
- Du-Bro Products
- Futaba Corp. of America
- Great Planes Model Distributors
- Hobby Stop West
- Horizon Hobby Distributors
- JR Racing
- MGA Enterprises
- Midwest Products
- Ohio R/C Models
- RC America
- Riders Hobbies
- Slimline Mfg.
- TNT Landing Gear

THE LITTLE BLACK BOX

This year, the IMAC Nationals were run according to the current printed rules, which do not include any limitations on radio equipment. A few pilots took full advantage of this ruling and installed gyros in their planes. A gyro is basically a device that attempts to keep the plane flying along its inertial path. Corrections to rudder and/or elevator are made without the pilot's knowledge based on the plane's previous and current paths. This device tends to improve the presentation of maneuvers such as hammerheads, snap exits and slow rolls. In this year's standings, five of the top nine pilots used gyros. So what makes these little black boxes so controversial?

The most common complaint from non-gyro users is that "... the plane is being flown by a computer ... small corrections made automatically are great for a computer competition, but this is supposed to be a pilot competition." Another complaint is that using a gyro means one must buy a high-end radio to control it; the competition then becomes a race among those who can afford the most expensive equipment.

Pilots who choose to use gyros argue that if one starts with a bad heading or path, the gyro will continue to hold it. Furthermore, current AMA rules for IMAC do not exclude gyros.

IMAC'S ANSWER

AMA pattern rules currently forbid any radio-control device that places the aircraft in anything less than full pilot control at all times. Additionally, prestigious invitational events such as the Tournament of Champions and the Masters forbid the use of gyros. The IMAC Board of Directors receives more comments from its members regarding this subject than any other. If a vote by the Board were to take place today, gyros would be banned. Eliminating them from competition is not that simple, though. As a special-interest group of the AMA, IMAC must rely on the AMA's three-year rule-cycle. The next rule-cycle vote on this subject will occur in October 1999. Even if gyros are banned during this vote, the issue must pass through several layers of voting by the AMA, much like a bill before Congress. In short, if everything were to pass, the new rule wouldn't take effect until the year 2002. Contest directors do have the authority to ban gyros if they publicize the ban at least 30 days in advance of the event; several regions have already used this loophole to eliminate the use of gyros. Fueled by the encouragement of the IMAC regional directors, this trend will probably continue throughout the nation until gyros are banned at most competitions. Some will balk while others will cheer, but I guess that's why they call it a controversy instead of a dead issue.

Guide to Small Motor Flight

"How much did that motor cost?"

"Ten bucks."

"Ten bucks!? Nothing for airplanes costs ten bucks anymore!"

That's part of a conversation I had with a fellow modeler at my club field last spring, after I had just flown my Modelair-Tech Dimwatt. He didn't believe you could have that much fun flying a plane with a $10 powerplant, but you can. In fact, you can explore just about any facet of powered radio-controlled airplanes, from sport to scale, aerobatics, racing and, of course, powered sailplanes, with models powered by the modest powerplants known as "Speed 400" motors.

Thanks in no small part to the availability of tiny, efficient and moderately

SPEED

Charging Small Cells

Most of the fast battery chargers on the market are intended for the higher capacity cells found in R/C cars and larger electric airplanes. This is especially true of inexpensive chargers, which often have a fixed charge rate which is much too high for the 500 to 600mAh cells commonly used in S400 models. Using a charger with a fixed output current of 4.5 amps may charge a 600mAh pack in only eight minutes, but will very quickly ruin the cells; they may even explode! For reasonable battery life, these cells, especially the more fragile 600AEs, are better charged at 1.5 amps or less.

To do this, you need an adjustable-rate peak charger such as the AstroFlight 110D or 112D, or a less expensive, more specialized charger for small cell counts. A charger such as the 110D is the most flexible solution, as it can charge a wide variety of E-power systems—up to 18 cells. If you have only one charger, it probably should be one of this type. Many E-fliers, however, have more than one charger. Having two allows you to fly almost continuously, or to charge two very different-size power systems without always re-adjusting things, or worse, forgetting to switch the settings and cooking a battery.

If you'd like to keep the cost of your charger low, and/or you'd just like to have a small charger dedicated to charging small packs, you might consider the new little charger being distributed by Dymond Modelsport. These guys are importing some really neat gear for electrics fliers, and this pocket-size charger is one of their new items.

It has selectable charge rates for 1, 2 and 4 amps and can charge 4 to 7 cells. The 1A charge rate is ideal for the 600AE cells typically used in Speed 400 airplanes. It's a peak-detection charger and, thus, provides a simple "push the button" operation that will peak your pack. When the pack is peaked, the charger switches to a trickle mode; small LEDs on the face of the charger indicate the charging condition. This charger is small (1x2x4 inches), making it easy to stow it away in the glove box of your car or in your flight box. Best of all, Dymond sells it for $39.95. It's also useful for fast-charging your receiver packs. I've been using mine a lot, as it's so darn handy; I just leave it in the car so it's available wherever I go.

—Larry Marshall

priced electronic speed controls, and the high performance per dollar of the motors themselves, small electric models are a rapidly growing segment of R/C all over the world. Several recent articles in this magazine illustrate this.

What is "Speed 400" anyway? Speed 400 is a Graupner trade name for several Mabuchi 380 motors of various winds. It has become a generic term for any motor that's about the same size as a Mabuchi 380, made by any motor maker and sold by any hobby company. The motors weigh a bit less than 3 ounces, have plain bearings and shafts that are 2.17mm in diameter. You may know them from your small cordless screwdriver, or your hairdryer. There's one inside the Coleman Air Port pump I use to inflate air mattresses when we go camping. I'll call them "S400" from now on, as not all the motors I'll be mentioning are sold by Graupner.

Soon to be released by SR Batteries, the new X250 is a high-quality S400 ARF sport plane that is fully aerobatic.

Popular in Europe for some time, and growing fast in the US, is S400 pylon racing. Imagine, if you will, a pylon racer that spans 32 inches, weighs about 14 ounces and can do 80mph in level flight. You say, "Only 80mph?" Remember, a 32-inch model going that fast gets small in a hurry. And remember, too, the motor that powers it costs about $10.

Or, how about sport-scale models of just about anything you can imagine? There are kits available for fighters and reconnaissance planes (Mustang, Spitfire, Mosquito, Lightning, Bf-109, PBY Catalina), transports (C-47, Ju-52 3m, de Havilland Dash-8, even the C-130), and more. Note that many of these are multi-engine subjects. Scratch-builders are doing amazing things. For example, I know of at least two S400-powered renditions of the

Below: the three most commonly used cells for S400 models. Left to right: Sanyo 500AR, SR 500 Max, Sanyo 600AE.

400 POWER SYSTEMS

by Bernard Cawley Jr.

Ni-Cd cells for small models

CELL	CAPACITY	DIAMETER (IN.)	LENGTH (IN.)	SPEC. WEIGHT (GM)	7-PACK WEIGHT (OZ.)	COMMENTS
Sanyo 500AR	500mAh	0.67	1.1	21	5.0	More punch than 600AEs.
SR 500 Max	500mAh	0.67	1.1	21	4.8	Best pre-assembled packs.
Sanyo 600AE	600mAh	0.67	1.1	21	4.7	Widely available, inexpensive.
Sanyo 600AA	600mAh	0.56	2.0	26	NA	Very inexpensive, but less punch.

Pack weight is for 7 cells, side by side, shrink-wrap, 2 inches of 15 gauge wire, Powerpole connectors.

WANT SOME MORE POWER?

If you like the idea of small electric models but you want more performance than the inexpensive S400 motors can give, you might wonder, "Is there anything available between the S400 type and the larger, heavier, 'oh-five' or R/C car motors?" Well, the answer is a resounding yes!

For a little more money and a little more weight (about an ounce more), there are the "Speed 480" motors. These are a bit bigger in diameter, have larger, replaceable brushes and can be found for around $40, with ball bearings and adjustable timing. They operate best at a higher current level; 15 to 20 amps rather than the 8 to 12 amps of S400 types, so they need speed controls with at least a 20A continuous current rating and will need larger cells to give the same flight times. A couple of gearboxes are available for these motors, and they will also fit the Modelair-Tech H-100 belt drive.

But what if you don't want more weight, or you want more efficiency, or you don't want to worry about brushes wearing out? Then, for $200 for the motor and special speed control, you can get the new AstroFlight Brushless 020. This motor is smaller than an S400, and its matching controller is also quite compact. Together, the two weigh just about the same as an S400 and a Castle Creations Sprite 20. But—and here's the cool part—you can run this combo on 10 cells at 15 amps, which is just about twice the power level of an S400, for the same weight. More of that power goes into turning the prop, too, since the little brushless motor is at least 15 percent more efficient than an S400. That means that if you use the brushless 020 at S400 power levels, you'll either get higher performance and similar durations, or similar performance and longer flights, especially if you fly at part throttle a lot, as I do.

So, if an S400 is a little too tame for you, there are several ways to go faster or climb higher without giving up the fun of a small electric plane.

Speed 400 motors and gearboxes

SR Batteries X-Gearbox, mounting adapters and pinions.

MOTOR	SUGGESTED CELL COUNT	CAPACITORS?	PROP ADAPTER?	PRICE	COMMENTS
Graupner no. 1794 (7.2V)	7-10	yes	no	$11.90	
Graupner no. 3321 (6V)	6-8	yes	no	$12.70	
Graupner no. 3320 (4.8V)	4-6	yes	no	$13.75	
Rocket 400 (HLH780)	4-5	no	no	$9	Plastic backplate
Robbe Power 400/45	7-10	no	no	$10	
Robbe Power 400/35	6-8	no	no	$10	
HiLine Elf-50	4-5	yes	yes	$15.95	Capacitor not installed
Peck Silver Streak	6-9	yes	yes	$19.95	Ventilated plastic backplate; power leads with 3-pin Deans connector included
Griggs G-400	5-7	no	no	$9.50	
MPFC M-50 (7.2V)	6-9	no	no	$9.95	Plastic backplate
MPFC M-50 (9.6V)	8-10	no	no	$9.95	Plastic backplate

All motors are 1.1 inches in diameter, 1.5 inches long (without the shaft), have plain bearings and 2.17mm shafts and weigh approximately 2.6 ounces.
Unless otherwise noted, capacitors (if supplied) are installed.

GEARBOX	TYPE	RATIO(S)	PRICE	OUTPUT SHAFT DIA.	PROP ADAPTER?	COMMENTS
Graupner 400 FG	spur	1.5, 1.8, 2.3:1	$35.70 w/motor	4mm	no	Plain bearings
Modelair-Tech H-100	toothed belt	2.57, 3, 3.27, 3.6, 3.43, 4.0,4.36, 4.8:1	$39.95	3/16 in.	$5 extra	Two ball bearings, lots of ratios available
Graupner SpeedGear	2-stage spur	4:1	$65.70 w/motor	1/8 in.	no	Plain bearings
Robbe Planeta 400	planetary	3.7:1	$50 w/motor	1/8 in.	no	Plain bearings
SR X-Gearbox	planetary	4.4:1	$81.85 with adapter and pinion	4mm	no	Two ball bearings, similar gearbox also available from Model Electronics
Hobby Lobby "Titanium" gearbox	internal pinion/ring	1.72, 2.6:1	$31.40	4mm	yes	Two ball bearings
Jastron	2-stage spur	6:1	$98.30 w/motor	4mm	no	Two ball bearings
Mini-Olympus	spur	2.3:1	$15.50	6mm	yes	Plastic gears; one bronze bushing

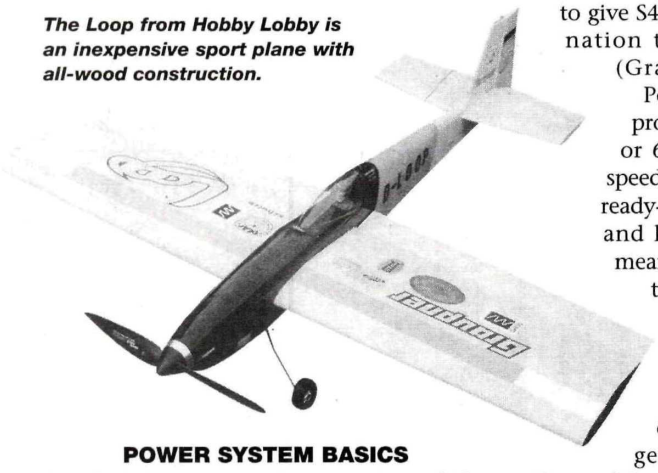
SPEED CONTROLS FOR SMALL ELECTRICS

Speed control	Cell range	Digital/ analog	Max. continuous current	Dimensions (in.)	Advertised weight (oz.)	Ready to use weight (oz.)
Castle Creations Sprite 20	6-12	digital	20A	0.9x0.6x0.3	<0.5	0.7
Castle Creations Pixie-14	4-10, 6-18 w/BEC disabled	digital	14A	0.8x0.4x0.3	<0.5	0.6
Castle Creations Sprite 25	6-16	digital	25A	0.9x0.6x0.3	<0.5	NA
JETI JES-10B	6-8	analog	10A	1.4x0.8x0.4	0.75	1.1
JETI JES-10C	6-10	analog	10A	1.1 dia. x 0.4	0.67	0.9
JETI JES-18	6-10	analog	18A	1.4x0.8x0.4	0.75	NA
Jomar MicroMax	5-8	digital	20A	1.1 dia. x 0.2	0.63	NA
New Creations M-20	6-12, 6-18 BEC disabled	analog	10A	1.9x0.8x0.3	0.53	1.1
Simprop RS400 BEC	6-10	analog	18A	1.3x1x0.4	1.0	1.0
Tarling MicroStar 10	6-10	digital	10A	1.4x0.7x0.35	0.35	NA
Tarling MicroStar 20	6-8	digital	20A	1.4x1x0.35	0.46	1.1
Viper Micro Demon 102	6-8	digital	15 A	1.8x0.85x0.39	0.75	1.2

All speed controls listed have the following features: high switching rate, battery eliminator circuit (BEC), motor cutoff, minimum of 10 amps continous current rating (for length of motor run).
All come supplied with a receiver lead and plug, but no power connectors, unless otherwise noted.
Ready-to-use weight includes supplied wire, receiver leads, arming switch (if supplied) and cut-down Powerpole connectors on both battery and motor leads.

Hughes H-4 (aka the "Spruce Goose") that are flying. There are even ducted-fan units available for these motors, eight of which have flown a sport-scale B-52 in England! The simplicity and low cost of these power systems encourage all sorts of creativity and experimentation. Of course, these small, inexpensive motors work just fine in sport flyers, too.

The Loop from Hobby Lobby is an inexpensive sport plane with all-wood construction.

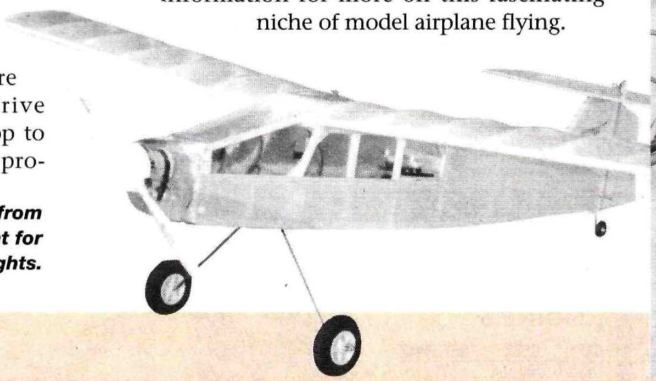


POWER SYSTEM BASICS

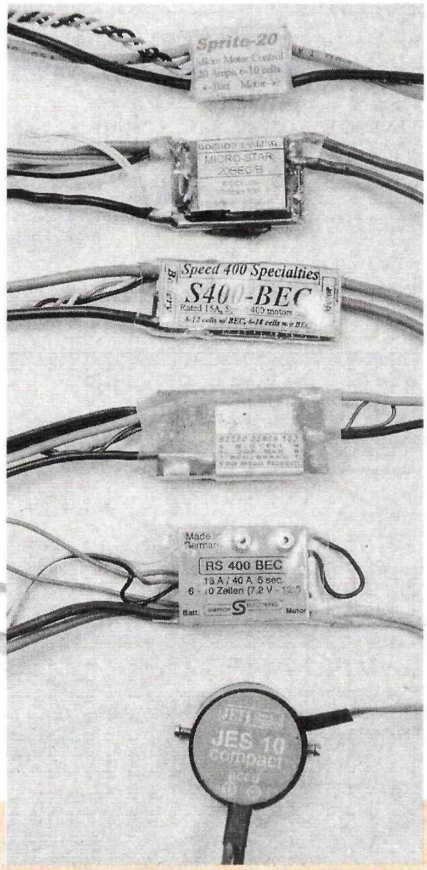
An electric power system consists of the motor, the motor control (which does the job of the throttle servo and the throttle itself on a glow or gas engine), the battery (which is really the "fuel tank") and the propeller. There may also be a reduction drive between the motor and the prop to swing a larger, more efficient propeller. Shown in the accompanying tables is information on some of these S400-type products that are readily available in the United States. They are not exhaustive lists, but samplers.

There are lots of choices, even within this niche of electric flight. If you just want to give S400 models a try, a good combination to start with is a 6V motor (Graupner no. 3321, or Robbe Power 400/35), a 6X3 or 6X3.5 prop, a battery made of seven 500 or 600mAh cells, and any of the speed controls in the table. Keep the ready-to-fly weight under 18 ounces, and have a ball. Yes; I know that means running a "6V" motor on 7 to 8 volts, but that is one of the "tricks" to getting enjoyable performance from these motors. From there, you can explore various combinations of motors, batteries, props and gear reductions, depending on the model and the kind of performance you want. And keep your eye on *Model Airplane News* and the other sources of electric flight information for more on this fascinating niche of model airplane flying.

Here's my DimWatt, built from Modelair-Tech plans. It's great for long, relaxing flights.



Above: the Skat is a hot pylon racer. We reviewed it in the July 1998 issue. Below: a sampling of S400 speed controls. Top to bottom: Castle Creations Sprite 20, Gordon Tarling MicroStar 20 BEC/B, Speed 400 Specialties S400BEC (very similar to New Creations M-20 or Marty Parsons Flying Circuits M-15), Viper Model Products MicroDemon 102, Simprop RS 400 BEC, Jeti Model JES-10C.



Brake?	Motor restart?	Arming switch?	Setup method	Retail price	Remarks
yes	yes	no	auto	$54.95	Smallest 20A ESC on the market
no	yes	no	auto	$49.95	Extremely tiny, has mode for use w/4-5 cells
yes	yes	no	auto	$69.95	On-resistance of 0.0023 ohms
yes	no	yes	one pot	$49.80	No Rx connector
no	no	yes	one pot	$42.90	Attaches directly to back of motor; no Rx connector
yes	no	yes	one pot	$56.90	No Rx connector
yes	yes	yes	auto	$59.95	Attaches directly to back of motor; supplied with Sermos power connectors installed
no	yes	no	two pots	$55	Similar units available under other names
yes		no	one pot	$56.90	Can also be set up as soft-start on/off control
no	yes	no	auto	$55	
yes	yes	yes	auto	$60	Can also be set up as soft-start on/off control
no	yes	yes	auto	$59.95	Reverse throttle stick response relative to all other ESCs

Addresses are listed alphabetically in the Index of Manufacturers on page 174.

F8F BEARCAT

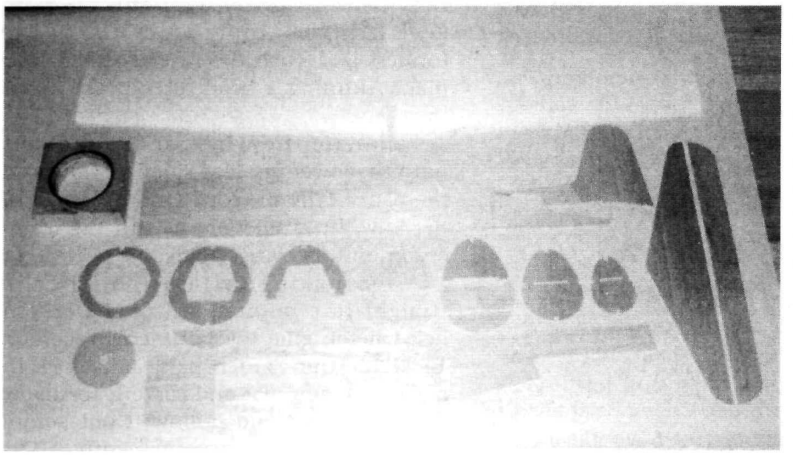
by Jim Ryan

WW II DREW TO A CLOSE just as a whole generation of advanced combat aircraft was entering service in the U.S. armed forces. One of the most impressive of these was the Grumman F8F-1 Bearcat, which was literally en route to the Pacific Theater at the time of Japan's surrender. Although the family resemblance to its famous forebear, the F6F Hellcat, is apparent, the Bearcat owed its inspiration to a detailed study of a captured German Focke-Wulf 190A.

Hot Speed 400 Warbird

To surpass the Fw 190, Roy Grumman directed his design team to build the smallest practical airframe around the same 2,100hp Pratt & Whitney R-2800 that powered the much larger Hellcat. All other factors took a back seat to minimum weight and maximum performance, and the result was astonishing. The fighter that rolled from the Bethpage plant on August 21, 1944, could take off across a typical runway, and it set a time-to-climb record (10,000 feet in 94 seconds) that stood throughout its service life and well into the jet age. Even today, a modified F8F-2, Lyle Shelton's Rare Bear, holds the world speed record for piston-engine aircraft with a blistering 528mph. For all that, the true genius behind the Bearcat was manifested in its outstanding handling characteristics and wonderfully balanced controls. The result was an aircraft that could make a strong claim as the finest piston-engine fighter in history.

Many modelers who have built my Speed 400 Hellcat design (see the July '97 issue of *Model Airplane News*) have suggested that I design plans for the other wartime Grumman fighters, the Wildcat and the Bearcat. The products of the "Grumman Iron Works" provided the decisive margin in history's greatest naval war, and these immortal fighters have held a special place in our hearts ever since. So with flight operations CNX'ed by rain one weekend, I sat down at my computer to design a model of Roy Grumman's masterpiece.



Begin construction by cutting a "kit." As you can see, the total parts count is low, and this makes for quick construction.

SPECIFICATIONS

Model: F8F Bearcat Speed 400

Type: 1/14-scale electric warbird

Wingspan: 30 in.

Length: 22.25 in.

Wing area: 170 sq. in.

Weight as flown: 18 oz.

Wing loading: 15.3 oz./sq. ft.

No. of channels req'd: 3 (throttle, elevator and aileron)

Power: 6V Graupner Speed 400, 7 or 8 Sanyo 600AE Ni-Cds, Micro BEC speed controller

Features: thinned Clark Y airfoil, foam-core wing, simple balsa construction.

Comments: while simple in structure, the Bearcat is very true to scale; the thinned wing and the lack of LE "crank" are the only significant deviations. Weight is critical, and the builder must resist the temptation to add surplus reinforcement. Because of its small size and short coupling, it's targeted to experienced modelers, preferably those who have some electric experience.

CONSTRUCTION NOTES

The airframe was designed in AutoCAD. The fuselage is a balsa semi-monocoque structure, and the wings are foam sheeted with 1/32-inch balsa. The weight goal for the empty airframe is 7 ounces. I use regular thin CA for most construction, but this adhesive will attack foam. For all wing construction, I recommend foam-friendly odorless CA or an aliphatic adhesive.

The foam wing-cores and vacuum-formed canopy are available from me for $24 postage-paid. Send check or money order to Jim Ryan, 6941 Rob Vern Dr., Cincinnati, OH 45239; (513) 729-3323; email: jimryan@sprintmail.com.

THE WING

The foam cores are lightly sanded and cleaned with a shop vacuum. The 1/16-inch sub leading edges are installed with odorless CA and trimmed flush. The wing skins are glued up from 1/32-inch balsa; I recommend Pica* Gluit, which won't leave hard glue ridges. After sanding and cleaning the skins, attach them with light coats of 3M Super 77 adhesive to save weight. Trim the skins flush with the sub leading edges, then install the 1/8-inch leading edge (LE) caps. Trim the roots and tips flush with the cores, then trim the trailing edge (TE) to the chord shown on the plans. Finally, install the 1/2-inch balsa wingtips and sand them to shape.

Cut the ailerons from the wing panels as shown on the plan and apply 1/8-inch balsa to the exposed TE. Trim 1/4 inch from the LEs of the ailerons and install their 1/8-inch balsa LEs. If you wish, you can trim the ailerons shorter and face their inboard ends with 1/32-inch balsa.

Before joining the wing panels, you need to bevel the roots to the proper angle. Align the root of the wing panel with the edge of your work bench and block up the wingtip 1 1/4 inches. Use a sanding block to bevel the root. Repeat with the other panel. Then, again blocking each wingtip up 1 1/4 inches, join the wing panels with thick odorless CA. Apply 1.5-ounce glass reinforcement tape to the joint with thin odorless CA.

Next, install the aileron torque rods. These are made of 1/16-inch music wire and 3/32-inch brass tube. Note that the torque rods mate with the ailerons at the very end, forming the inboard hinge for the surface. The easiest way to install the torque rods is to cut through the bottom sheeting, remove the underlying foam and then install the torque rods with thick odorless CA, being careful not to get any glue inside the brass tubes. Next, fill in the slot with 1/8-inch balsa and sand it flush. Cut the hinge slots and dry mount the ailerons. I recommend installing the 1/16-inch-ply aileron servo mount after covering the wing.

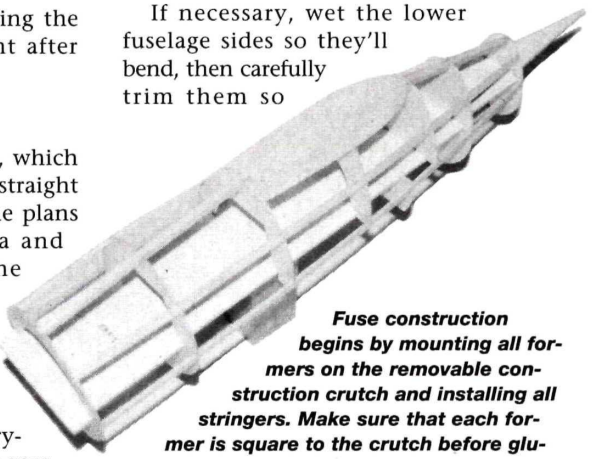
THE FUSELAGE

The fuselage is built over a crutch, which makes it easier to ensure a light, straight assembly. The crutch shown in the plans is cut out of 1/8-inch hard balsa and marked as shown. Note that the crutch is to be removed when the fuselage is complete. Do not glue any of the formers to the crutch!

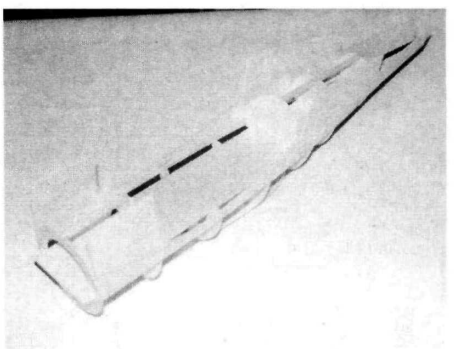
Slide each former over the crutch into its marked position. Dry-fit the 3/16-inch square top stringers into place and, after making sure each former is exactly perpendicular to the crutch, glue the top stringers to the formers with thin CA. Repeat this step for the 3/16-inch square bottom stringer, again making sure the formers are square to the crutch. Note that F-6A and F-6B must be beveled and joined at the proper 30-degree angle to allow removal of the wing. You'll also need to trim the slot in F-6B for the 3/16-inch stringer to seat properly. Finally, dry-fit the 3/32x3/16-inch upper and lower side stringers and CA them into place. You should now have a light and straight framework.

Secure the lower fuse sides to the lower side stringers with thin CA. Make sure the lower sides overlap exactly half of the side stringers as shown on section F-3 in the plans; the stringers will make it easier to glue the upper fuse sides to the lower sides.

If necessary, wet the lower fuselage sides so they'll bend, then carefully trim them so



Fuse construction begins by mounting all formers on the removable construction crutch and installing all stringers. Make sure that each former is square to the crutch before gluing the stringers. Also install the cockpit floor at this time.



With the fuse assembly inverted, the lower fuse sides are glued in place. Wet the sides, push them together and glue them in place.

FLIGHT PERFORMANCE

Be very careful checking the CG; this model is short-coupled, and it's tough to handle in an aft CG condition. I suggest you start with the CG 2 inches behind the LE of the wing where it exits the fuse and adjust it to suit your tastes. If you keep the weight at around 18 ounces, the Bearcat should fly just fine.

• TAKEOFF AND LANDING

I strongly recommend getting a capable assistant to hand-launch the model on the first flights. The model needs to be thrown straight and level. If the launcher lobs it upward, it's likely to stall. Hold the wings level and let it climb slowly as the speed builds up.

Landings are made with a straight-in approach, and the model is simply held just off the ground until it settles in. The Bearcat has very little tendency to tip-stall, but don't tempt fate with tight turns onto final.

• FLIGHT CHARACTERISTICS

The model does a good job of mimicking the handling characteristics and climbing performance of the original. For your first flights, I recommend 7 cells. I use 8 cells to improve the vertical, but I spend most of each flight at ½ to ⅔ throttle. Running 8 cells wide open shortens motor and battery life considerably.

• AEROBATICS

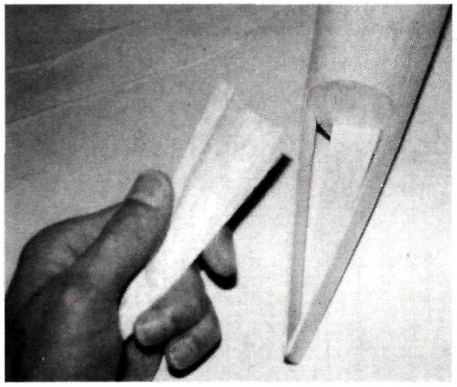
What's the point of a model that looks like a Bearcat if it doesn't fly like a Bearcat? This model is remarkably aerobatic for its small size and modest power. Huge loops and Cuban-8s are no problem, and the roll rate is very fast. I like making an overhead pass and then dropping through a split-S into a strafing run. The inverted performance is solid and predictable. It's a model you'll get comfortable with very quickly. Thank you, Roy Grumman!

they'll join tightly over the 3/16-inch keel stringer. Apply thick CA to the formers and push the fuselage sides into place, running a bead of thin CA down the seam.

Laminate the wing saddle doublers onto the lower fuselage sides as shown on the plans. Trim or block-sand the edges of the lower fuse sides flush with the formers around the wing saddle.

After making certain that they're straight (the pointed tail of the crutch helps here), glue the tail pieces together. Tack-glue the ½-inch balsa tail block in place with thin CA and carve it to shape, then remove it and hollow it out before gluing it back in place permanently.

At this point, I recommend you carefully slide the crutch out of the fuse assembly and apply 2½x2½-inch "doublers" made of 1.5- or 2-ounce fiberglass cloth to the inside surface of the lower fuselage sides between F-2 and F-3. Simply fit the patches in place, smooth them down and then saturate them with thin CA. You might also apply glass cloth doublers to the area right behind F-6 at the TE of the wing, since this is where you grip the model to hand-launch it. Also, install ¼-inch triangle stock to the joint between the wing-saddle doubler and F-3 at the LE of the wing to help rein-



The lower tail block is carved to shape, removed and hollowed out before being permanently glued in place.

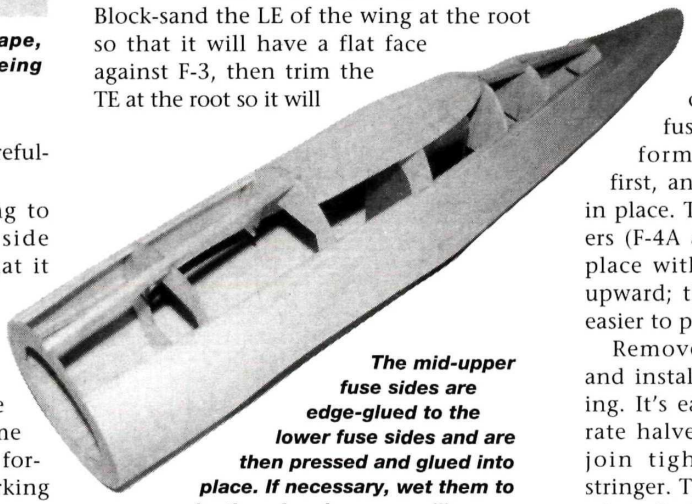
force this high-stress area. Finally, carefully slide the crutch back into place.

Edge-glue the mid-upper sheeting to the bottom sheeting and lower side stringers. If necessary, wet it so that it will conform to the upper formers. To minimize the chance of it becoming warped, I recommend you glue the lower edges of both sides into place and then tack-glue both sides into place at the same time by pinching them down against the formers, starting at the middle and working toward the ends.

At this point, you should remove the crutch before installing the top sheeting. By now, the fuse should be very stiff. Glue the lower edges of both pieces of top sheeting into place against the mid upper sheeting, then trim the pieces so they join tightly over the 3/16-inch top stringers. If necessary, wet the top sheeting to push it into place, and CA the joint. The main fuse construction is now complete.

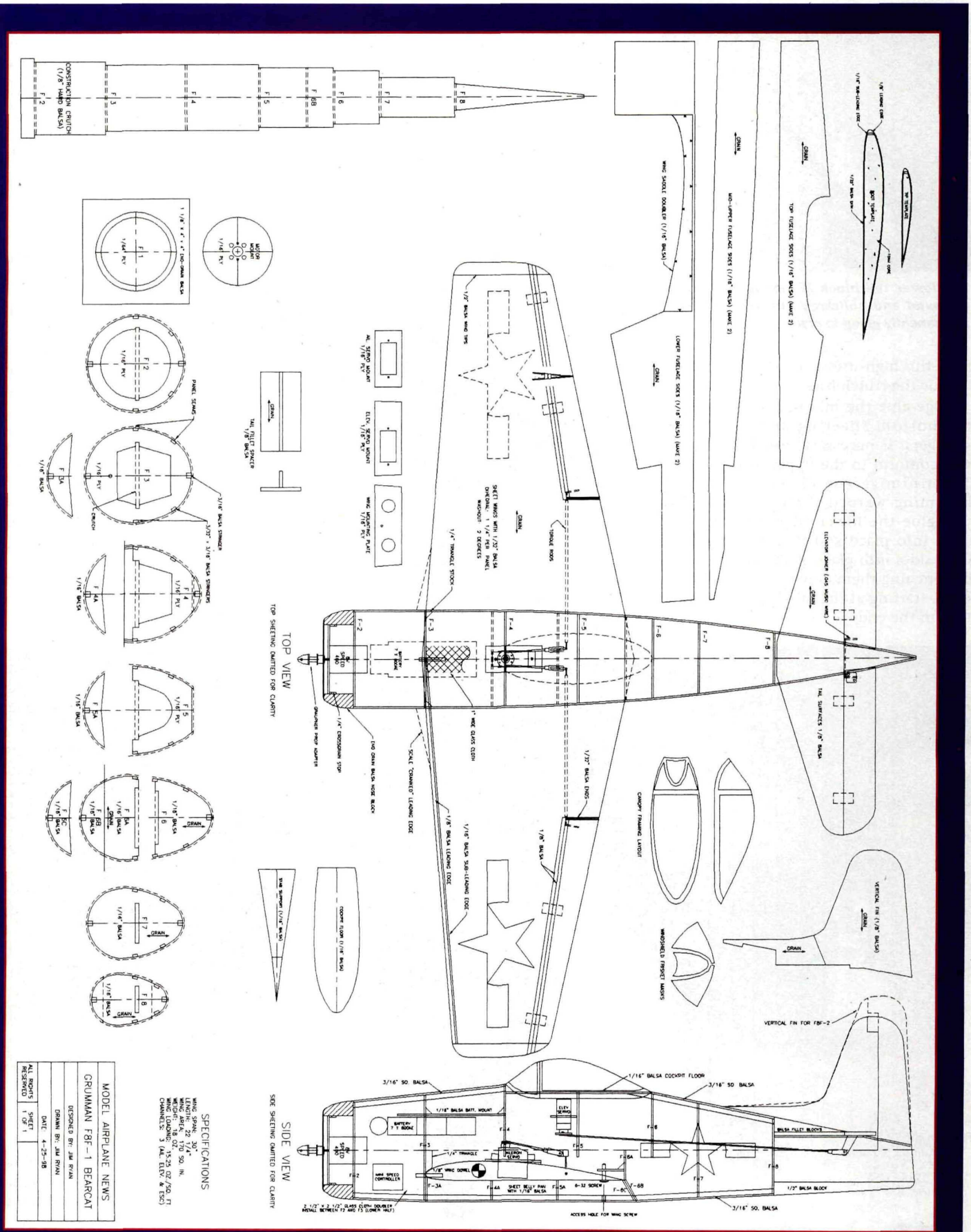
WING INSTALLATION AND BELLY PAN

Block-sand the LE of the wing at the root so that it will have a flat face against F-3, then trim the TE at the root so it will fit into the wing saddle. Tap the 1/16-inch-ply wing mount for a 6-32 nylon screw, glue the mount in place in the fuselage and reinforce the joint with 1/4-inch-balsa triangle stock. Drill the screw hole through the wing and install the 6-32 nylon wing screw. Square the wing with the tail of the fuselage, pinning it in place in the proper position. Drill the LE of the wing to accept the 1/8-inch locator dowel. Remove the wing, install the dowel and re-install the wing with a sheet of wax paper sandwiched between the wing and fuselage. Install the belly pan formers on the bottom of the wing, being careful not to glue them to the fuselage. Glue the front and back formers (F-3A and F-6A) in place first, and then dry-fit the keel stringer in place. Then trim the middle two formers (F-4A and F-5A) until they can fit in place without bowing the keel stringer upward; this makes the belly pan much easier to plank.



The mid-upper fuse sides are edge-glued to the lower fuse sides and are then pressed and glued into place. If necessary, wet them to make them bend more readily.

Remove the wing from the fuselage and install the 1/16-inch belly pan sheeting. It's easiest if you do this with separate halves and trim them so that they join tightly over the 3/16-inch keel stringer. Trim and sand the front and rear edges flush with the formers. Cut an 1/8-



FSP01991

F8F Bearcat

To order, call (800) 537-5874.

This Speed 400 model was CAD-designed by Jim Ryan and features a thinned Clark-Y airfoil, foam-core wing and simple balsa construction. It is true to scale and, with a weight of only 18 ounces, is remarkably aerobatic. WS: 30 in.; L: 22.25 in.; motor: Speed 400; 3 channels; 1 sheet; LD 3. $14.95.

inch access hole over the wing hold-down screw (this will leave the screw trapped in place so that it won't get lost) and re-install the wing on the fuselage. Sand the joint between the belly pan and fuselage sheeting flush, being careful not to sand through the sheeting.

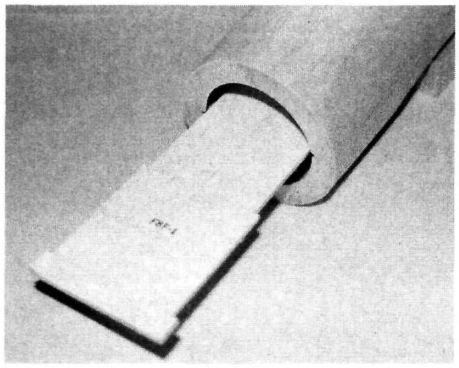
EMPENNAGE

Fit the triangular stab base into place between the fuse sides and secure it with thin CA. Assemble the wing to the fuse and trial-fit the stab on the stab base. Make certain the stab is parallel to the wing, and if necessary, sand the base or add shims to correct any error. Remove the wing and stab and glue the tail fillet blocks into place using a T-shaped 1/8-inch-balsa spacer as a guide (be careful not to glue the spacer in place). Carve and sand the tail fillets to shape.

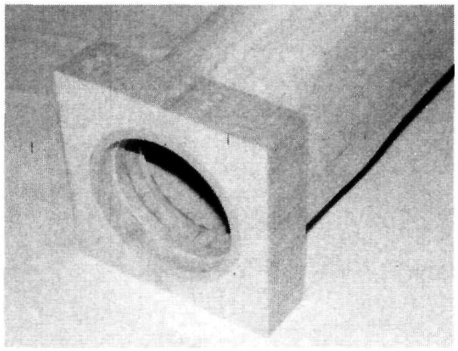
The tail feathers are simple 1/8-inch balsa sheet stock. Glue the vertical fin pieces together and let them dry. Cut the elevator hinge slots and test-fit them. Now remove the balsa spacer from the tail fillet. If you've been careful with the glue, it should slide right out. You can add an 1/8-inch-balsa spacer to support the tail fillets behind the stab, but make sure you leave room for the music wire elevator joiner. Cut a slot in the turtle deck to accept the key at the forward end of the fin fillet. Dry-fit the vertical fin and stabilizer and test-install a 1/16-inch music wire elevator joiner (you can use an 1/8-inch dowel joiner if you prefer). I found it easiest to wait and permanently install the vertical fin and stabilizer after finishing.

COWL BLOCK AND LAST DETAILS

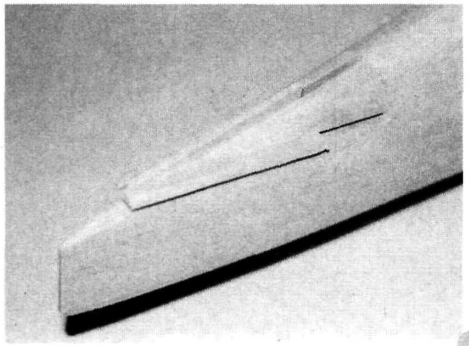
The cowl is a block of end-grain balsa that is carved to shape. Vacuum-forming it or carving it from blue foam would be easier and cheaper, but neither would have the needed combination of light weight and high strength (remember, the Bearcat is going to take landings right on its blunt chin). Note that the block is bored for the motor opening and a 1/4-inch-wide strip of cross-grain balsa is glued in place to provide a shoulder for positioning the motor mount. Draw datum lines on the front of the block and use them as a guide for installing F-1, which is really just a sanding guide. Then glue the block in place onto F-2 and carve and sand it to final shape. I recommend waiting until the model has been covered to install the 1/16-inch-ply motor mount with thin CA.



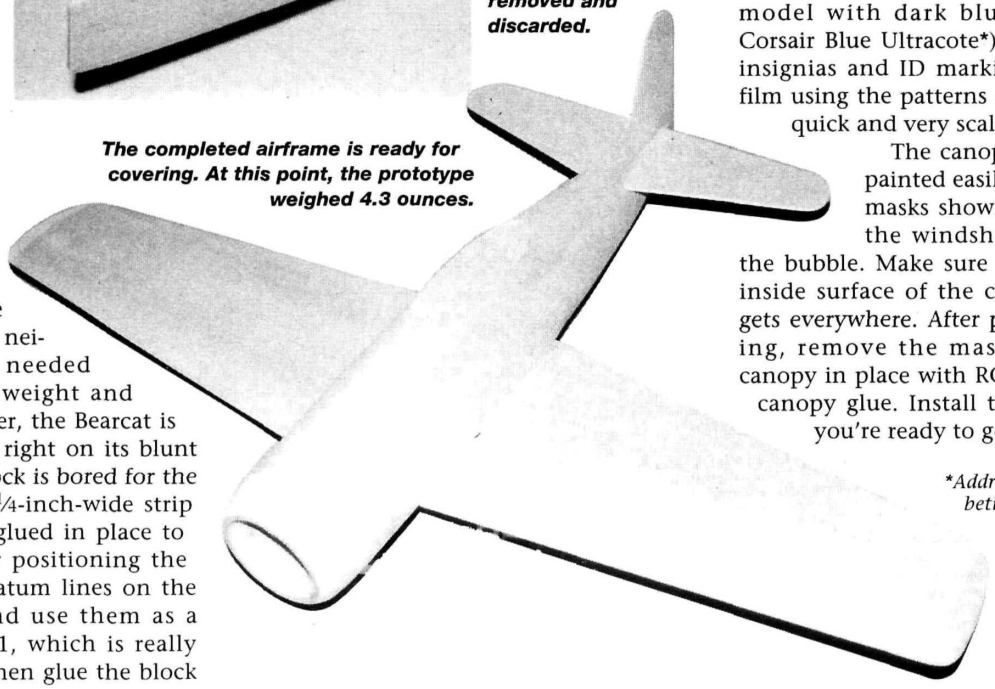
After the fuselage has been completed, slide the construction crutch out the front and discard it.



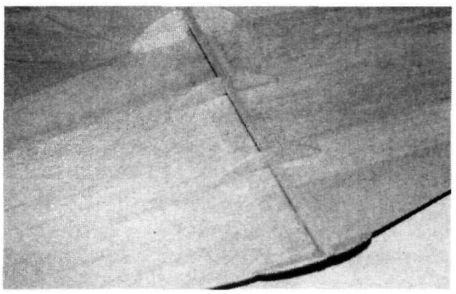
The cowl block is glued in place and then carved and sanded to shape. It also provides the mounting surface for the plywood motor mount, making the nose very strong.



The tail fillet blocks are glued in place with the help of an 1/8-inch balsa T-shaped spacer. The fillet blocks are carved and sanded to shape, then the spacer is removed and discarded.



The completed airframe is ready for covering. At this point, the prototype weighed 4.3 ounces.



The belly pan formers are glued to the bottom of the wing, and then the 1/16-inch balsa belly sheeting is added. Make sure that you install the nylon wing-mounting screw before building the belly pan so it will be trapped in place.

Install the elevator servo mount with thin CA. I recommend installing the aileron servo mount after covering. Cut the battery mounting plate out of 1/16-inch balsa and install it on F-3 and F-4, using 1/4-inch triangle stock to reinforce the joint. Apply a strip of Velcro® to the mounting plate so that the Ni-Cd pack can be secured. I use .038-inch music wire for the pushrods to keep weight to a minimum. Another option for the elevator is to install Kevlar pull/pull cables. If you opt for music wire, I've found that Sullivan* 2-56 brass couplers (no. 512) are perfect for these small models; just solder them in place and add a small nylon clevis.

FINISHING

Although I like painting my models, I recommend film covering for a small naval fighter such as this. After covering the model with dark blue film (I prefer Corsair Blue Ultracote*), cut the national insignias and ID markings out of white film using the patterns on the plans for a quick and very scale finish.

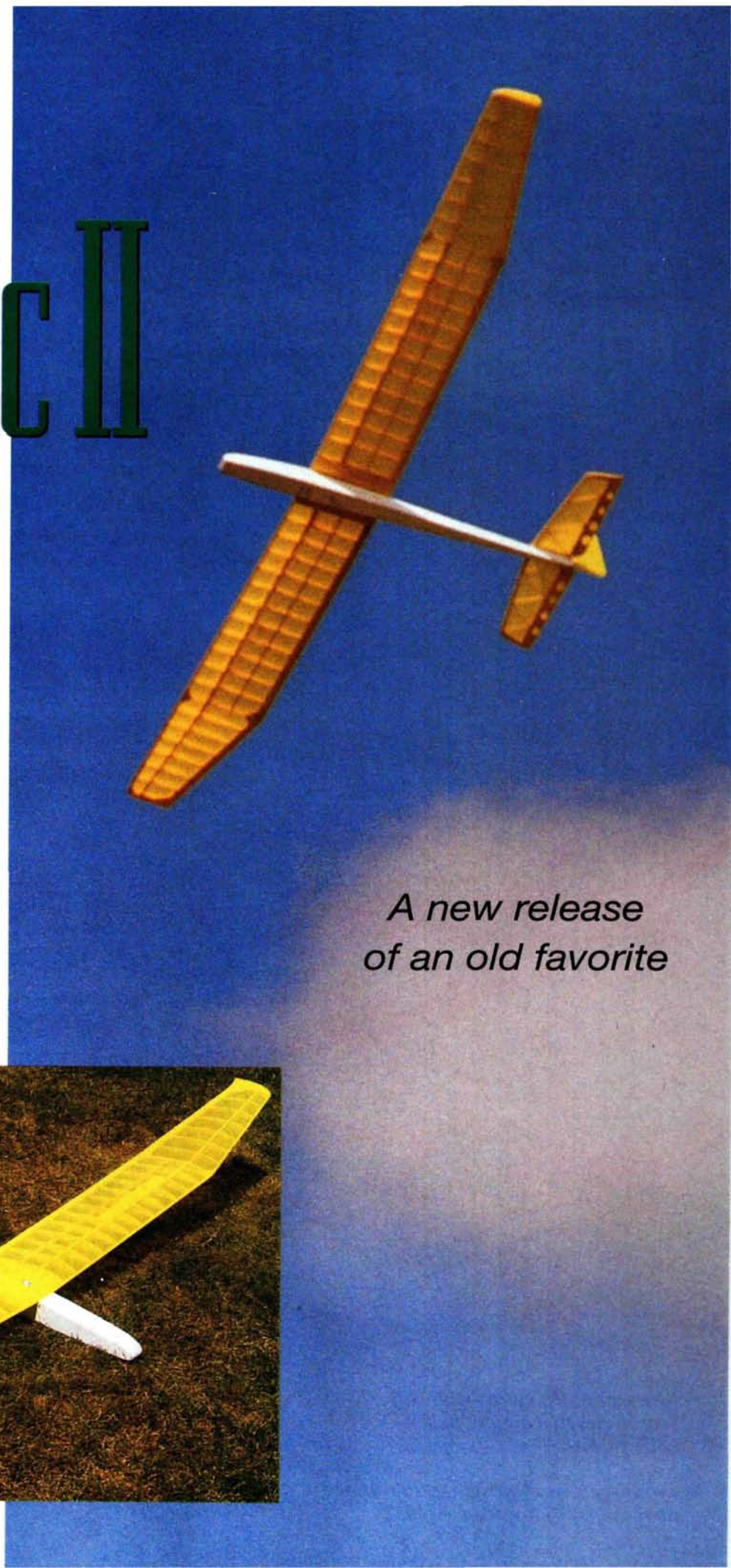
The canopy framing can be painted easily using the frisket masks shown in the plans for the windshield and tape for the bubble. Make sure you mask off the inside surface of the canopy; overspray gets everywhere. After painting the framing, remove the masks and glue the canopy in place with RC-56 or equivalent canopy glue. Install the hardware, and you're ready to go fly.

**Addresses are listed alphabetically in the Index of Manufacturers on page 174.*

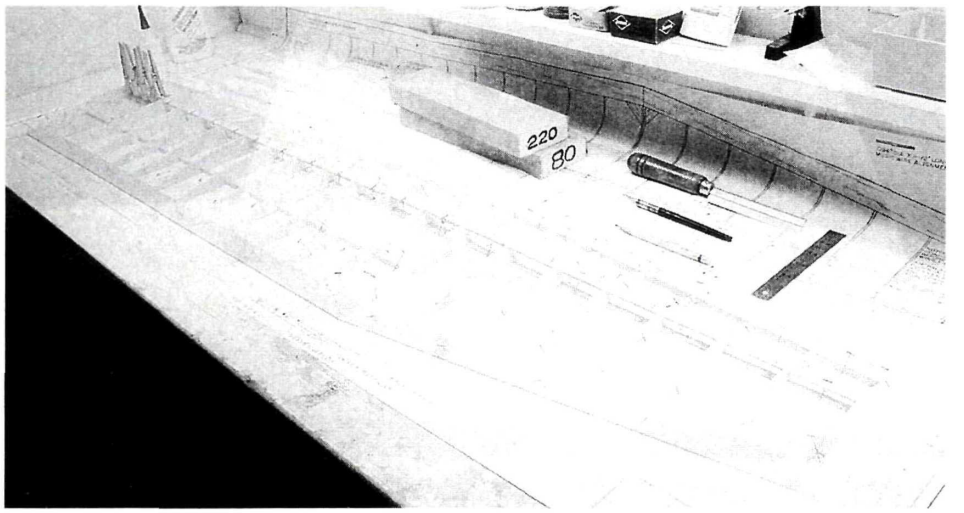
Whyte Wings Olympic II

by Dave Garwood

The Olympic II holds a special place in my personal soaring development. It was the sailplane that gave me my first half-hour flight, and I scored my first contest win with this stick-built balsa glider. When I decided to fly in Nostalgia and R/E/S (rudder/elevator/spoiler) contests, I turned again to the Olympic II. Designed by Lee Renaud and first published in June 1976, Airtronics made a high-quality Olympic II kit for many years. The model is available again in a kit meticulously produced by Ed Whyte at Whyte Wings*.



A new release of an old favorite



The Olympic II inner wing panel and tip panel pinned to the building bench over the plans.

A simple 4-channel radio easily controls the plane; two standard-size servos and a standard 650mAh, square battery pack fit comfortably inside the fuselage. A 2-channel radio can be used if you decide not to build the spoiler option. For this review, I installed a modern radio system, the Hitec* Focus IV FM. This combination serves as a wonderful, inexpensive introduction to R/C soaring flight.

The Olympic II is designed with a two-piece wing and includes instructions for optional removable tail parts to make storage and transportation more convenient. It launches and flies splendidly and cores thermals effortlessly. A slow and stable plane, large enough to see at a distance, it will right itself from odd flight attitudes if the pilot loses orientation or makes a dumb-thumbs move. It's as good as any available for novice and intermediate soaring pilots and builders.

KIT CONTENTS AND CONSTRUCTION

The Whyte Wings Olympic II introduces two upgrades and enhancements to the original design: a new, 15-page instruction booklet with plenty of photos and a wing-joiner rod whose diameter has been increased from 1/4 to 5/16 inch. The die-cut ribs are exceptionally well made.

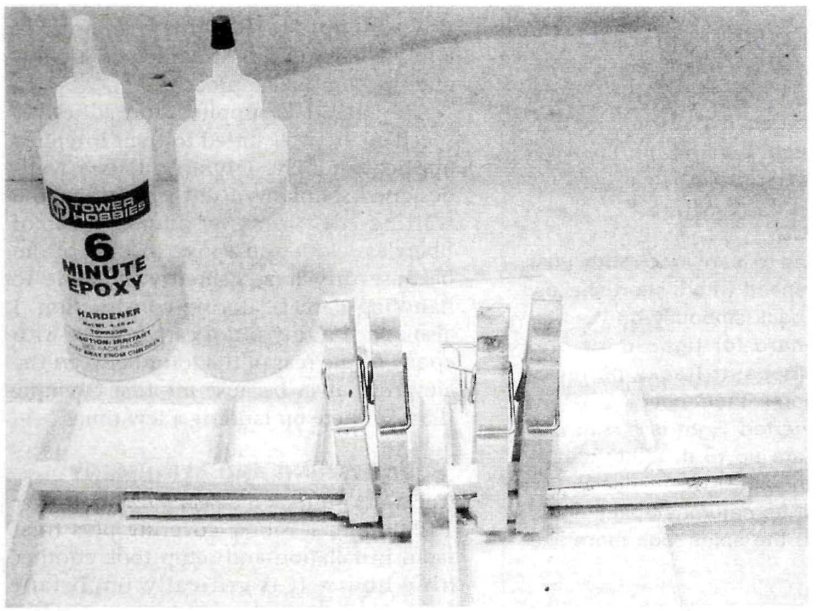
It is a complete kit, including all balsa, spruce and plywood needed, plus control cables and small hardware for the 2-channel version as well as the tow hook. The builder needs only to supply covering material and a radio. Additional wood and hardware are also needed for the 3-channel spoiler option and the optional removable tail assembly.

Construction is well within the ability of any modeler who has built one or two balsa-rib aircraft of any type, including control-line or rubber-powered free flight kits.

Basically, you cover the plans with waxed paper and glue the bits and pieces together over them. Working on a 24x48-inch sheet of Homosote® insulating material or soft ceiling tile makes this easier because these materials take T-pins well.

I used a combination of aliphatic resin (tan carpenter's) glue on larger, time-consuming assembly work and quick-setting CA on smaller, simpler assemblies. Epoxy is recommended in a few places. Use long sanding blocks to sand more quickly and easily. I prefer to finish the fuselage with sanding sealer and paint, as this handles the wear of landings and handling better than covering.

I had only one construction problem: the precut plywood fuselage bottom was not wide enough for my servo installation. Although that part matches the plans, it is just a bit too narrow to fit three standard-size servos mounted crossways as shown on the plans (the third servo is for the optional spoilers).



I set the wing-joiner rod brass receiver tubes in place in the inner wing panels with epoxy. The next night, I filled the joiner box with epoxy and micro-balloons and closed it with the 1/16-inch plywood provided in the kit.

PHOTOS BY DAVE GARWOOD

SPECIFICATIONS

Model: Olympic II

Manufacturer: Whyte Wings

Type: trainer and intermediate sailplane

Wingspan: 100 in.; standard class

Length: 49 in.

Weight: 45.3 oz., as built (1.5 oz. nose weight)

Wing area: 928 sq. in.

Wing loading: 7 oz./sq. ft. (as built)

Airfoil: flat bottom, 10-percent thickness

Engine req'd: none

Radio req'd: 2- or 3-channel

List price: $89.95

Features: the Olympic II is a proven design constructed of traditional materials, and traditional adhesives can be used throughout. Building methods will be familiar to anyone who has built balsa planes before. Heat-shrink plastic can be used for covering.

Comments: the Olympic II is a solid-flying sailplane that serves admirably as an R/C training glider as well as an introductory machine for competition.

Hits

- High-quality wood.
- Two large sheets of clear, full-size plans.
- Nearly complete instructions, suitable for less-experienced builders.
- Stable, gentle, predictable flight characteristics.

Misses

- One plywood part may need modification for spoiler servo installation.
- An important procedure for setting wing flatness and tip washout is not mentioned in the instructions (see article).

My solution was to cut another plywood fuselage floor. You could also widen the supplied parts by gluing ⅛-inch strips of spruce along their sides and sanding them to shape. If you mount only two servos, this will not be a problem for you. Another solution is to use smaller servos, but this drives up the cost of the completed plane.

THE SPOILER QUESTION

I say, yes; go ahead and build the optional spoilers. As you gain experience with the plane, spoilers will dramatically increase your landing accuracy. They will steepen the descent path without adding air speed, giving you an extra dimension of control for precise landing as well as a method of escaping those killer thermals before the plane becomes too small to see.

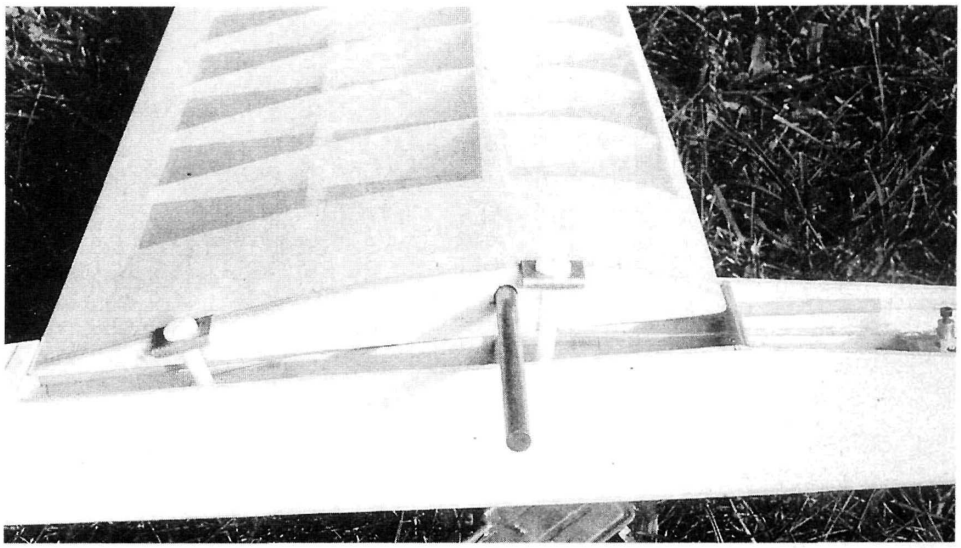
Instructions for spoilers in this and many wooden kits call for a string in a tube to open the spoilers, which works well, but closing them with springs, rubber bands, or magnets has often been troublesome for me. This time, I connected the spoiler control horns to the servo with Sullivan* Very Flexible Metal Cable. With this rig, the servo both opens *and* closes the spoiler blades. At the servo end, the cables terminate in fine brass tube that's soldered to the cable, ground to half-round, and connected to the servo arm with a Du-Bro* Heavy Duty EZ-Connector.

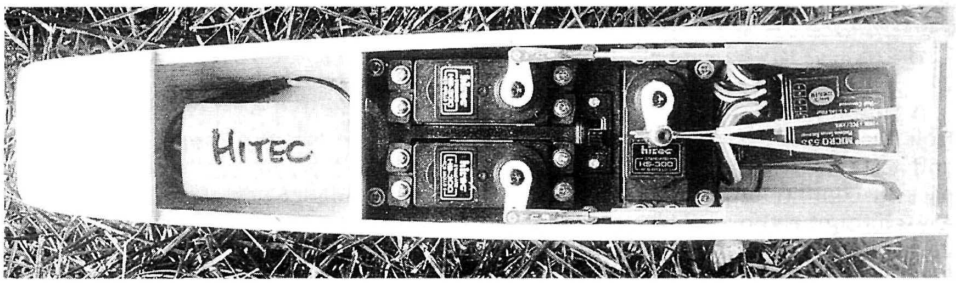
Note that the plane pitches down when spoilers are deployed, and you will learn to compensate with elevator to keep the nose up. Practice this maneuver at altitude before using it while you are low and slow on final approach.

The materials supplied and adhesives specified are well suited to their intended application. The Olympic II is a well-designed sailplane. I did strengthen the trailing-edge joint by adding a bit of fiberglass cloth and epoxy to the bottom because this area seemed vulnerable to handling damage during construction. I also added a tiny bit of carbon fiber with epoxy to the rear of the joint between the elevator halves because my first Olympic II broke there on landing a few times.

COVERING AND ALIGNMENT

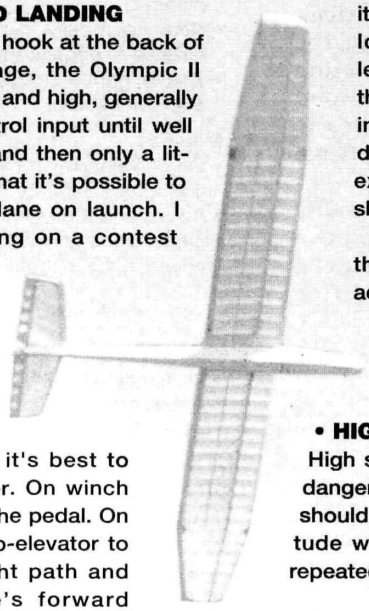
Construction took me nearly 67 hours over 15 building sessions; covering plus final radio installation and setup took another nine hours. It is critically important





Right, above: bolt-on wing mount using NSP clips and ¼x20 nylon bolts. The bolts are threaded into plywood plates spanning the sides of the fuselage. Right: radio installation using the Hitec servo tray and showing the spoiler servo-linkage layout. Note that foam padding for the receiver and battery pack has been removed for this photo.

FLIGHT PERFORMANCE



• TAKEOFF AND LANDING

With CG and tow hook at the back of the specified range, the Olympic II launches straight and high, generally requiring no control input until well into the launch, and then only a little rudder. Note that it's possible to overspeed the plane on launch. I fluttered one wing on a contest winch launch, and fluttered both wings on a large high-start. No damage ensued in either case, but it's best to avoid wing flutter. On winch tow, go easy on the pedal. On high-start, pull up-elevator to steepen the flight path and slow the plane's forward speed. In case of a pop-off, recover with a loop. If you're not yet comfortable with these maneuvers, stick with a lower-powered winch or smaller high-start.

The plane lands like a dream: slow, predictable and completely controllable down to stall speed. Installation of the optional spoilers will add a measure of precision to your landings.

• LOW-SPEED PERFORMANCE

The Olympic II has only one speed, and it's pretty slow. This is a benefit to low-time pilots and those with lesser reaction time, but it limits the plane's capability to range out in search of faraway lift. It is not designed for fast flying, but flies extremely well within its intended slow-flight regime.

This sailplane defines effective thermal turning. It holds the turn accurately with little elevator input and turns tightly when coring a small thermal. It is an easy plane for beginners to fly.

• HIGH-SPEED PERFORMANCE

High speed, as in an extended dive, is dangerous for balsa thermal planes and should be avoided. It's best to lose altitude when needed using the spoilers, repeated loops, or a spin.

• AEROBATICS

This is the plane to learn loops with. Just gather a little speed with a short shallow dive and pull back smoothly on the elevator stick—hard for tight loops and easy for big loops. It tracks perfectly through the loop without needing rudder correction. Inverted flight is possible if your thumbs are up to it, although the descent rate increases dramatically. Oly II will spin, but its natural stability fights this maneuver; the spins look more like spiral dives.

to use a stiff, high-strength covering film on any large open-bay model to provide proper wing stiffness. Top Flite* MonoKote is a tried-and-true example that meets this specification. MonoKote comes in transparent colors, which are just as stiff as the opaque covering and slightly lighter, and the clear stuff lets the sun shine through the covered surfaces.

One important flight-preparation step on any open-bay construction sailplane that's not mentioned in the instructions is making sure that the inner wing panels are flat and that the outer wing panels are slightly and correctly warped. It's common for wing panels to be warped after you've covered them.

To check this, lay the panels on a flat surface and make sure that all four "corners" touch the bench evenly. You want the outer panels to be about ¼ inch *higher* at the trailing edge out at the wingtip than the leading edge at the tip. The higher angle of attack imparted by this geometry ensures that the inner panels will stall before the outer panels, giving more predictable, straightforward stall characteristics. It's more difficult to recover from a tip stall, where the plane falls off to one side.

Set the alignment of your wing panels by twisting them to the position that they need to be in, or a little further, and re-shrink the covering with your covering iron or a heat gun. Re-check alignment, and re-shrink as necessary to achieve accuracy. This process goes more quickly with a helper. Take your time, get it right, and you'll be rewarded with a sweet-flying sailplane that tracks straight.

The tow hook on my plane is mounted at the farthest aft position, and it's balanced at the rearmost position shown on the plans. I'm quite happy with the way it launches and flies with this setup and the factory-recommended control throws. If you're new to sailplanes, starting with both the tow hook and balance point (also called the center of gravity) more forward will give you a less aggressive launch angle and more stable, more self-correcting flight characteristics.

CONCLUSION

For this construction project, I wanted to keep the cost of the plane and the radio down. If so inclined, you can make good use of a computer transmitter to mix in elevator compensation when the spoilers are deployed. You can operate the servos with a pair of $50 microservos if you like, which will simplify field assembly. But for those who want to keep it simple, this plane and the Hitec Focus IV radio serve in fine form.

The Olympic II is one of the most satisfying sailplanes I've built and flown. With its stable launch, gentle flight and predictable landing characteristics, it makes an excellent trainer and introductory sailplane and can continue to serve for years as a contest machine for Nostalgia and R/E/S events. Considering that you can buy the kit for less than $100 and control it with a radio system that costs less than $150, you just can't go wrong with the new/old Oly II.

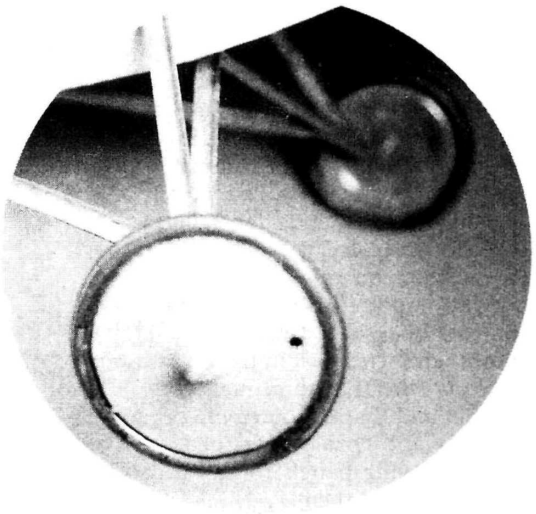
**Addresses are listed alphabetically in the Index of Manufacturers on page 174.*

Competition Modifications

I'm a contest flier, and I'm always looking for a performance edge in my equipment. The Olympic II design provides an opportunity for some enhancements. You may want to check with the sanctioning organization to see which mods are legal under Nostalgia or R/E/S rules. Here are the changes I made:

- **Beefier shear webs.** To add strength to the spar to withstand harder launches, I installed ⅜-inch-wide shear webs out to the polyhedral break and 1/16-inch-wide parts from the break to the tip.
- **Bolt-on wing.** To reduce drag created by rubber bands and hold-down pegs, I installed a wing-bolt mounting system patterned after the Northeast Sailplane Products (NSP)* Kestrel. NSP supplied the special clips, which grab a specially installed plywood root rib. Nylon bolts go through the clips and into threaded plywood plates that span the fuselage in the section under the wing.
- **Receiver switch moved inside.** Sometimes in the heat of competition, the final radio check is missed. I've even seen external switches turned off by an errant tow line. Not many things in model flight stop your heart faster than a launch with the receiver off.

  It's safer to have the airborne switch inside the plane. My switch fit perfectly on the servo tray provided in the Hitec Focus IV FM radio set. A Carl Goldberg Models* no. 464 Angle Hold Down to secure the hatch makes it more convenient to open it to reach the switch.



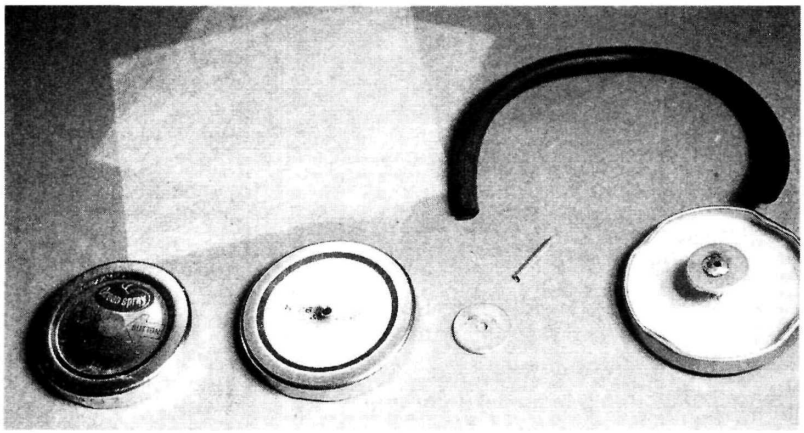
Light, easy and inexpensive

Make VINTAGE WHEELS Out of Jar Lids

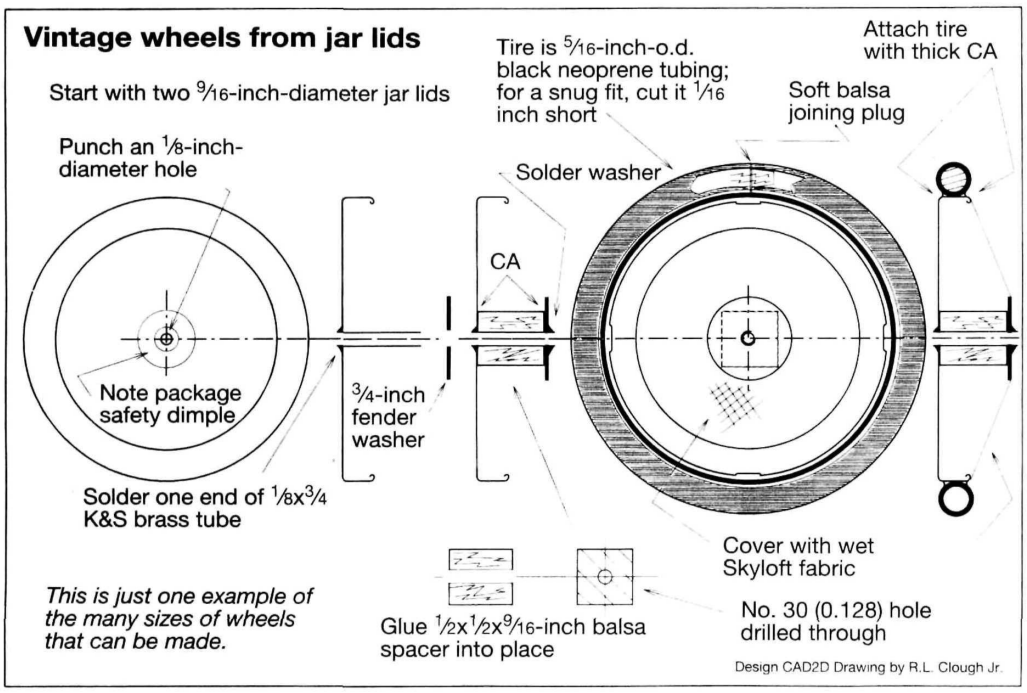
by Roy L. Clough Jr.

THE NEXT TIME you spread the last of the marmalade on your toast, chuck the jar and save the lid; it can be the foundation of a vintage aircraft wheel. These easy-to-make, lightweight wheels add an authentic touch to scale-type models of the 1930s and earlier.

Start by finding the center of the cap and punching an 1/8-inch-diameter hole. The best way to locate the exact center is by lightly grasping the lid in a three-jaw lathe chuck. If you have a good eye, the center dimple is a good guesstimate. There's also the trick of scribing several lines with a small square moved around the diameter; the lines will intersect in the center.



Everything you'll need to make a vintage wheel: a metal jar lid (shown in three stages of assembly), a washer, a short brass tube, Skyloft material and neoprene tubing.



Sand a small spot around the axle-bearing hole so the solder will stick to the lid, but leave the rest of the paint or lacquer coating in place; it makes a great primer for the rest of the job. Solder a bearing of K&S* tube into the hole. The photos show an 1/8-inch bearing, which will turn nicely on a 3/32 wire axle. Slip a balsa spacer block over the axle bearing, push the fender washer into place and solder them together. Now spin the wheel on a short axle wire, and correct any wobble by gently bending the assembly until the wheel tracks true. Next, puddle thin or medium CA between the ends of the spacer block and the metal parts and set it aside overnight.

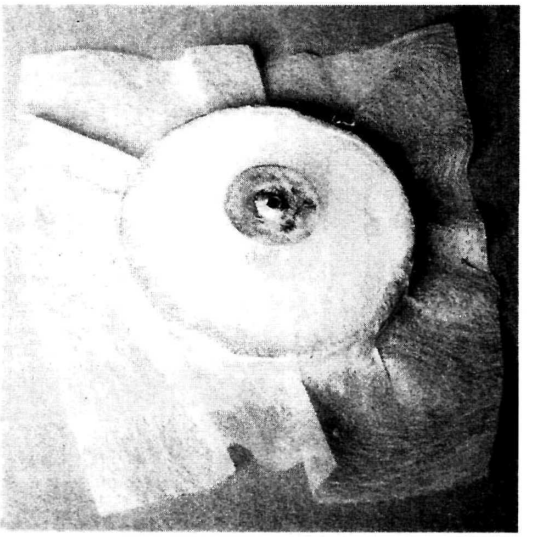
I use Skyloft*, a tough, nonwoven nylon, for the wheel fabric. Cut a piece that will project about one inch around the rim, then make a small hole in its center for the wheel bearing. Soak the Skyloft in water and pat it until it's merely damp. Coat a washer with tacky craft glue, and stick the damp material into place. Run a bead of tacky craft glue around the outer periphery of the wheel, and work the fabric into it, stretching it slightly to form a wrinkle-free cone. Smooth the glued-down circumference, but don't worry about the overlap bumps you'll get here and there. Let this dry overnight.

In the morning, the wheel should have a nice, drum-tight cover. Check the edges to be sure that they are stuck down, and work a little tacky glue into any spots

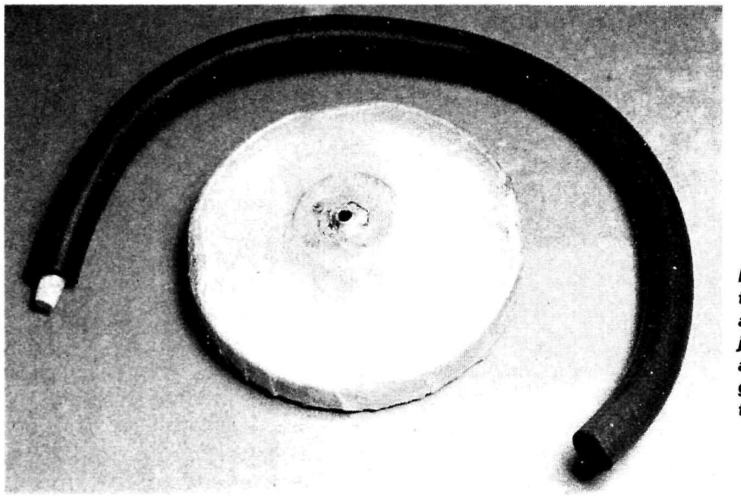
PHOTOS BY ROY L. CLOUGH JR.

Different diameters of jar lids, fender washers and K&S tubing allow a fairly wide choice of wheel sizes. Finished wheels are suitable for lightweight models up to 30 to 35 ounces.

After you've punched a hole in the lid, a metal tube, a balsa block and a fairing are soldered and CA'd into place.



Skyloft fabric is stretched over the lid.



Neoprene tubing with a soft balsa joiner makes a great tire to glue around the wheel.

that look thin. Coat the fabric two or three times with clear butyrate dope. When it has dried, apply your favorite color to both the fabric side and the original, lacquered metal back. If you want to gild the lily, simulate valve access by punching out a small disk of black paper then sticking it to the doped fabric near the rim.

The tires are made of black neoprene tubing (available in many sizes in most hardware stores). Wrap the tubing around the wheel and mark the needed length. Trim the ends of the tubing at a slight angle, but cut the tubing about 1/16 inch shorter than the circumference of the wheel. Make a joiner plug of soft balsa and use it to center the ends of the tubing when they are CA'd together. (Some might use a kicker with the glue; I don't because I've never had one of these tires come apart.)

Give the CA plenty of time to set up. Then roll the joint with thumb pressure to mash the balsa plug inside, and the joint will become practically invisible. Now slip the tire over the wheel. It should be a fairly snug fit, but it need not be tight.

Spin the wheel, adjusting it until the tire is centered as well as possible, then run a bead of thick CA cement around both sides where the tire meets the rim. Set the wheel aside in a horizontal position until the CA has set.

As noted on the plan sheet, different diameters of jar lids, fender washers and K&S tubing allow a fairly wide choice of wheel sizes. Finished wheels are suitable for lightweight models up to 30 to 35 ounces.

**Addresses are listed alphabetically in the Index of Manufacturers on page 174.*

MODEL AIRPLANE NEWS
PRODUCT
REVIEW

EVERY RADIO SYSTEM comes with a charger. These are simple affairs, designed to charge receiver and transmitter packs simultaneously at 50mA. These work OK to charge most systems' batteries overnight, so why would you want something else to charge your receiver and transmitter batteries? There are a number of reasons, most of which revolve around the grim reality that the connection between you and your model is completely dependent on properly functioning Ni-Cds.

Hobbico Accu+Cycle Plus

by Larry Marshall

Ni-Cds are an important part of what we do, and proper maintenance is extremely important. This means monitoring the condition of your packs, as well as proper charging and conditioning, so that your batteries provide long and reliable service.

Hobbico's* Accu+Cycle Plus is a tool that provides all of these abilities in a neat, easy-to-use package.

"Given the cost of models and equipment these days, it just doesn't make sense to ignore the batteries on which they depend."

The unit is divided into "transmitter" and "receiver" sections, and each side can be set up individually with respect to charging and discharging parameters. Charging is done using peak-detect charging at either 500mA or 1000mA. During a charge, the battery voltage is shown, and this gives you a good idea of how the battery is taking a charge. Charging with the Accu+Cycle Plus is quick; standard 600mAh cells can be charged in about 40 minutes.

But the Accu+Cycle Plus really earns its stripes in helping you monitor and maintain your batteries. As cells get old, their capacity begins to decline. If you know what the capacity was when the pack was new, you can use the Accu+Cycle Plus to monitor the decline. This is done by charging the pack and then using the discharge circuitry (discharging at either 250mA or 750mA) to drain the power from the pack. The Accu+Cycle Plus will report the pack's capacity and the time required to drain it. If you simply log these values occasionally, you'll have a good record of your pack's performance; you'll know when your pack is finally too old to be usable. Finding this sort of problem before flying an airplane with a bad battery will more than pay for the Accu+Cycle Plus.

The Accu+Cycle Plus also has a conditioner feature that will discharge and charge your packs repeatedly. Doing this helps match the cells and get the most capacity from a battery. One nice thing about this circuit is that there is a delay between the charge and discharge to let the cells rest. Some other chargers simply switch from one mode to the other without stopping, and this is very hard on the battery.

Because of the cell count selectivity, you can use the Accu+Cycle Plus to charge glow starters, 5-cell receiver packs and even 6- to 7-cell electric flight batteries. Because the Accu+Cycle Plus has a somewhat faster rate of charge than typical radio system chargers, it also makes it much easier to charge the larger receiver packs used by many of the giant-scale flyers.

One problem with the Accu+Cycle Plus is that, as it comes out of the box, it requires additional wires and plugs to match your particular radio gear. You must either buy or make up some charge cords. So if you're going to buy an Accu+Cycle Plus, be sure to buy some patch cords, too.

I really like the Accu+Cycle Plus. It does everything you need a TX/RX battery management tool to do, and it does it very well. Mine seems to be in constant use, which is generally an indication of how much "bang for the buck" I get from a tool. Given the cost of models and equipment these days, it just doesn't make sense to ignore the batteries on which they depend.

**Addresses are listed alphabetically in the Index of Manufacturers on page 174.*

SPECIFICATIONS

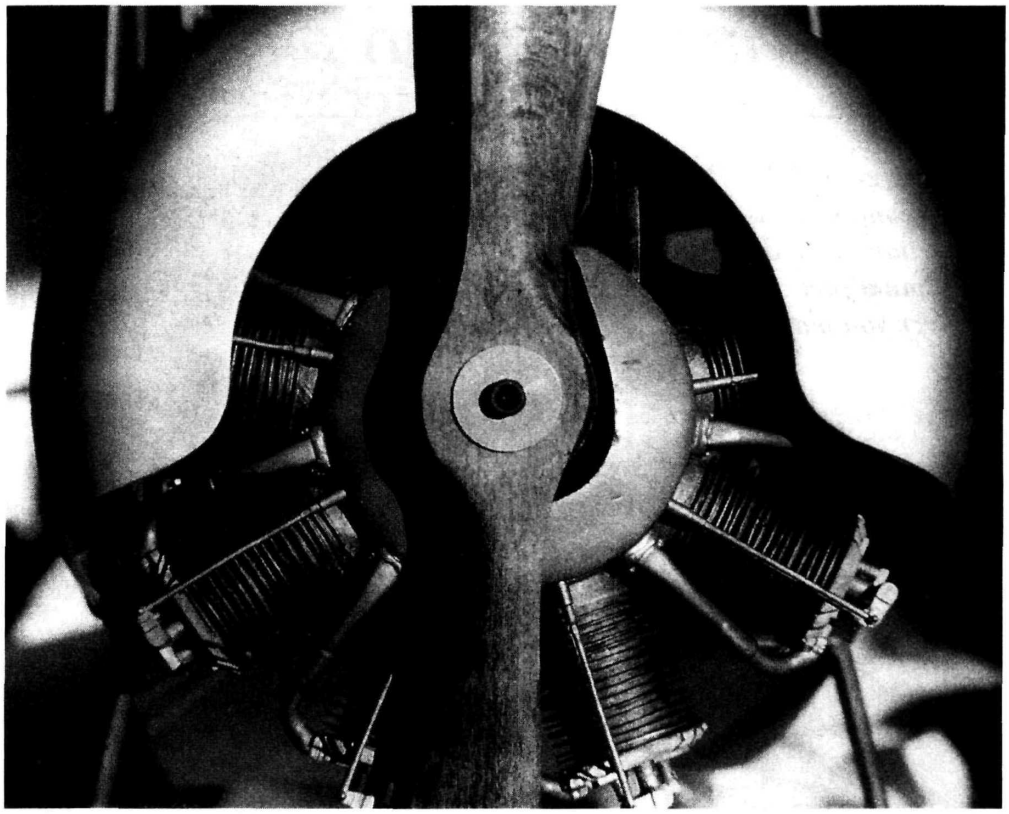
Name: Accu+Cycle Plus

Manufacturer: Hobbico

Street price: $160

Features: dual charge (peak detection) and discharge facilities, conditioning cycler, capacity to charge/discharge one to eight cells. Includes a digital display that presents battery capacity, battery discharge time, battery voltage and charge time.

Comments: everyone who relies on radio control to keep his models intact needs a tool such as this one to maintain and monitor his batteries.



Build a Mock Rotary Engine

Sturdy, light and scale

by Martin Irvine

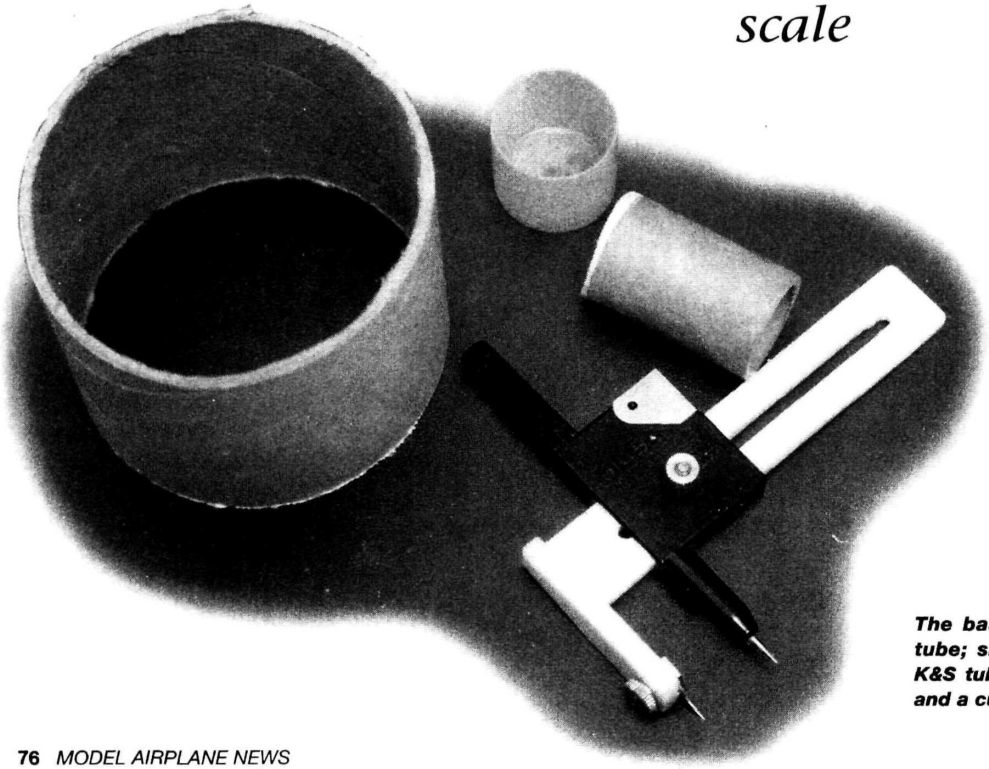
I NEEDED TO build a 1/5-scale dummy 80hp LeRhone for a 1915 Nieuport 12, but nothing commercially available would do the job. Every idea I came up with to build the finned cylinders seemed to be a tremendous amount of repetitive work or was likely to achieve a second-rate result—until this one. This basic method can be used for other scales and engines. The big plus is that although the fins are very thin, the structure is pretty sturdy.

The dummy crankcase is a piece of a mailing or drafting tube. If you can't find a suitable tube, make one by rolling brown packing paper, and use glue sparingly.

The "cylinders" are red cardboard tubes cut to length (as long as the cylinder is high—from crankcase to cylinder head). Cap the cylinder ends of the tubes with 3/16-inch sheet balsa and sand them to match the crankcase curve using sandpaper wrapped around the large tube.

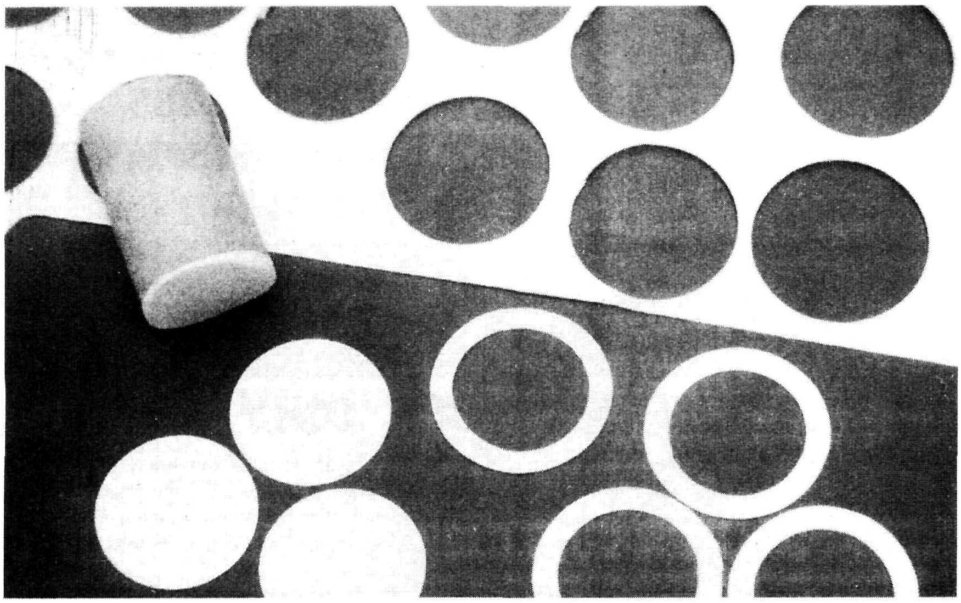
Cut the fins out of a manila file folder. Cut the outer circle first. On the LeRhone, the outer diameter of the fins changes, so about a third of the circles should be slightly larger than the rest. Now cut out the inner circle. This has to be slip-fit over the cylinder, so take your time to get it right. If it's too tight, the fin will become distorted when you put the cylinder on; if it's too loose, it will be difficult to glue into place.

Place the fins on the cylinder one or two at a time (align them using the plastic cap), and glue them into place with a drop or two of CA. Continue this process until you reach the top of the cylinder. Make the rest of the cylinders in the same way.

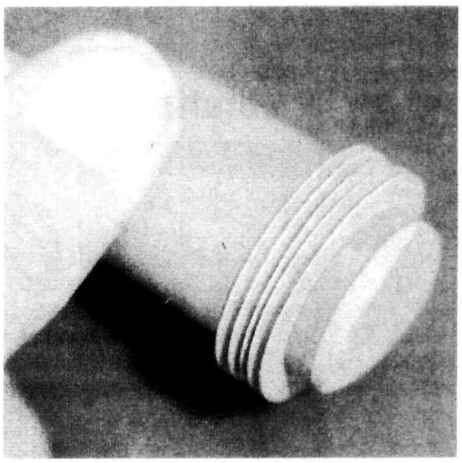


The basic components: a length of a large mailing tube; smaller, red cardboard tubes; the cap from a K&S tubing container (used to align the cooling fins); and a cutting compass.

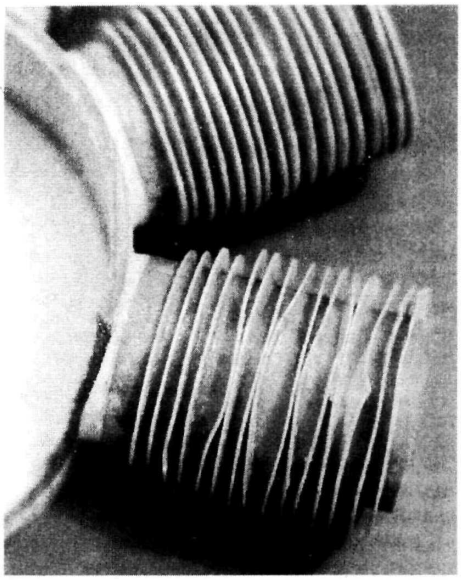
PHOTOS BY MARTIN IRVINE



The fins are cut out of a manila file folder.



Above: slide the fins onto the cylinder one or two at a time and align them using the plastic cap.

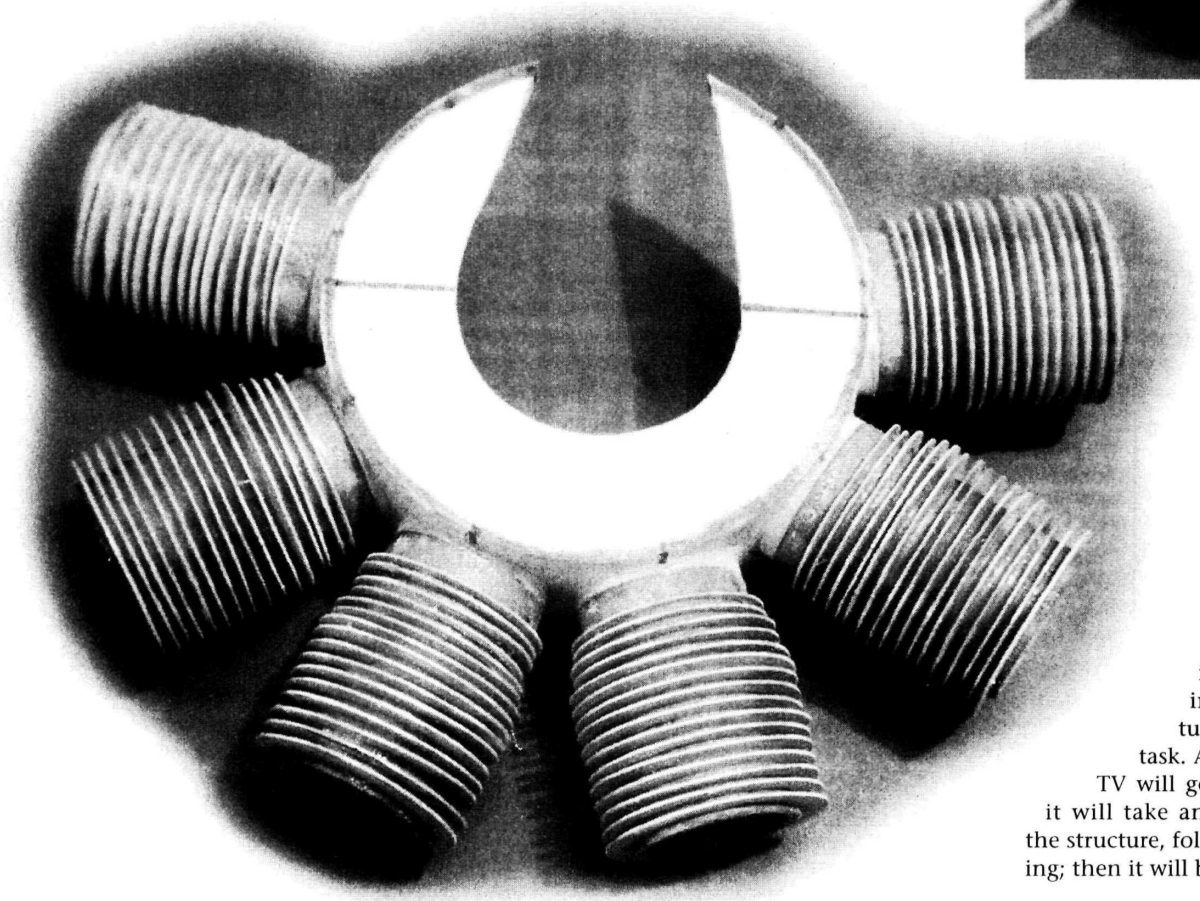


Right: after finishing the cylinders, I tried to brush on a coat of white glue, but the glue swelled the fibers in the paper fins, and they warped. I just turned this one around and glued it into one of the upper positions, out of sight.

The front of the crankcase is balsa. I added another piece of 1/4-inch balsa to the front and sanded it to a conic section to simulate the front of the LeRhone. I spaced the cylinders 40 degrees apart because the real LeRhone has nine cylinders (only six show). Be careful when you place the cylinders; the human eye can pick up even small discrepancies.

I mounted the finished project in the Nieuport cowl. The cylinder heads can be made out of 1/32- or 1/64-inch plywood disks with 1/32-inch plywood fins. The valves and pushrods are dowels, and the other bits are basswood. The intakes are modified parts left over from another kit, but you could easily carve or mold them.

I painted the dummy engine with a mixture of silver and black and painted the intakes copper. The next step is very important: go over everything with a wash of brown/gray thinner. I used the muck left over from cleaning my brushes.



Left: the bottoms of the cylinders have been sanded to match the curve of the crankcase and glued into place.

When you're faced with a task like this, regard it as a model in itself. Breaking it down into its component parts turns it into a less daunting task. An evening in front of the TV will get the cylinders finished; it will take another evening to finish the structure, followed by an hour's painting; then it will be ready for mounting. ✈

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

Small package, low cost, big fun

KYOSHO FERIAS

by Larry Marshall

NEED AN INEXPENSIVE way to get into R/C? Have you been wanting a small electric plane that you can fly anywhere? Do typical ARFs just take too long to build? If any of these things are true for you, take a look at the new Ferias from Kyosho*.

When I opened the box, I knew the Ferias would be a winner. My Ferias came covered with red transparent film on the flying surfaces and white and red opaque film on the fuselage. Out of the box, the pushrods for the control surfaces have already been installed, and the rudder and elevator are prehinged. The motor and its gearbox come mounted to the firewall, and the motor wires have already been fed into the fuselage. The fin is preglued to the fuselage; thus, assembly is minimal.

I first opened up the slot for the stab (it's covered with plastic film) and slid the stab in place. It's keyed to the fin, and this automatically provides proper alignment. A single screw is used to hold it in place. Installing the control horns on the elevator and rudder came next; it took only a few minutes.

Attending to the front end of the fuselage, the cowl must be aligned so that the propeller shaft protrudes through the predrilled exit hole; Kyosho provides some sticky tape to hold it on. I decided to mount mine using some small wood screws, which I drilled into the fire-

SPECIFICATIONS

Model name: Ferias

Type: Electric sport plane

Manufacturer: Kyosho

Wingspan: 39.5 in.

Weight: 22 oz.

Wing loading: 10.6 oz./sq. ft.

Motor: Mabuchi 380 w/gearbox (included in kit)

Battery/ESC used: 7-600AE cells; Castle Creations Sprite 25

No. of channels req'd: 3 (rudder, elevator, motor)

Radio used: Hitec Focus III

Street price: $99.00

Features: pre-assembled and covered. Control surfaces are prehinged and control rods are in place. The kit comes with a geared electric motor and a 9x5 propeller.

Comments: many have asked for an easy-to-build, easy-to-fly, small-field flyer. The Ferias fits all those desires really well.

Hits
- Well designed for small fields.
- High-quality assembly and covering.
- Light weight.
- Good power system included.

Misses
- Wing panels taped together (easily fixed using epoxy included in kit).

wall, but the tape would probably work here.

The undercarriage comes pre-assembled and prebent, so all you have to do is stick it into a slot in the bottom of the fuselage and insert a wooden plug to hold it in place. Before doing this, I coated the landing gear and plug with epoxy (included in the kit), and it has held up well in spite of a bunch of "off field" landings.

Servo installation is easy, as the servo rails are already in place. You just need to drill the holes and use standard hardware to hold them. I used microservos in my Ferias, but there's plenty of room for standard servos, and it flies so light that the bit of extra weight wouldn't matter. Since I was using the new Hitec Focus III radio, I installed the HAS-3MB receiver that comes with that system, and it has proven to be as reliable as it is small. I used one of the new Castle Creations* Sprite 25 speed controls, and it worked well, providing good control of power to the motor as well as to the receiver via its BEC circuit. I did replace the supplied "bullet" connectors with Anderson* Powerpole connectors, as all my chargers are set up for the latter. I fly the airplane with 7-600AE cells. Properly configured batteries are available as

HITEC
FOCUS III SS RADIO

When Hitec* released its Focus II radio, Dave Garwood began his review by saying, "Here's a radio that *many have been* waiting for ...." I hate to sound redundant, but the need for an inexpensive, 3-channel radio that has been generated by the renewed interest in *small glow and electric*-powered airplanes induces me to say, "Here's a radio that many have been waiting for."

The radio can be purchased with either standard servos (HS-300s) or HS-80 microservos. Although the two main channels are controlled by the same single stick as the Focus II, the Focus III has a slider on the back that handles throttle control. Ergonomically, this is in an ideal location, and it seems quite natural to control throttle using the slider.

For those who want to fly V-tail models, a mixing switch is included that uses two servos to electronically control V-tail. Servo-reversing switches are also included, and all of these are accessed from the rear of the transmitter.

The Focus III comes with an AM, single-conversion receiver that is small enough to fit into virtually any small plane. The system comes with a smaller than normal on/off switch for use with a receiver pack. The radio comes set up to use alkaline batteries, but the transmitter does have a charge plug, so if you stick 600mAh Ni-Cds in the transmitter, they can be charged in traditional fashion.

I've been flying the Ferias with my Focus III, and it has worked flawlessly; this radio is just the thing for my small planes.

RADIO SPECIFICATIONS

Channels: 3

Controls: single stick and slider

Modulation: AM

Servo-reversing: yes

Power indicator: green, yellow, red LED on TX case

Batteries: none (accepts alkaline or Ni-Cd)

Receiver: HAS-3MB, AM single-conversion

Servos: 2; HS-300 (standard) or HS-80 (micro)

Street price: $85.00

Comments: a simple, inexpensive 3-channel radio that's just the thing for small electric or glow-powered models.

Hits
- Transmitter has comfortable shape.
- Choice of standard or microservos.
- TX battery lights are easy to see.

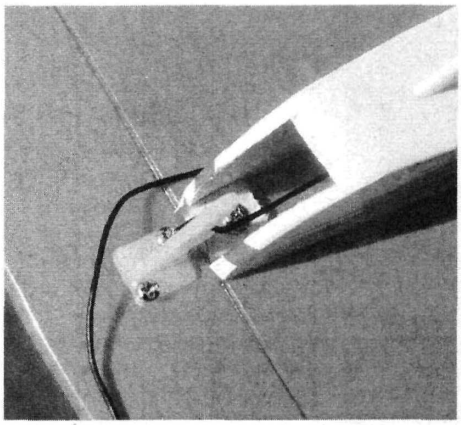
Misses
- Ni-Cds would be nice.

KYOSHO FERIAS

Kyosho part no. 71721.

The wing panels are completely built and covered. They come with some paper-covered sticky material on the two ends that come together to form the dihedral. You're supposed to remove the paper, stick the ends together at the proper dihedral and then use tape to hold the wing panels together. Kyosho has a bit more faith in tape than I do, so I used some of the 5-minute epoxy supplied in the kit to glue the two panels together.

At this point I had spent less than an hour assembling the plane. There it sat,



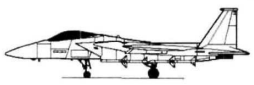
The stab slides into a slot and is held in place with a single screw.

with the supplied 9x5 propeller spinning on the nose as I checked the power system. I did spend another 20 to 30 minutes applying some of the decals provided by Kyosho.

Flying the plane is fun. It's not wildly aerobatic, though it will do stall turns, loops, snap rolls and such. But it really shines as a small-field, relaxed flying machine. Gerry and I flew the Ferias out of his backyard one night just before sunset. "Giggles" might be the best word to describe our responses during the session, as we were having a ball passing the sticks back and forth, wondering if we'd ever run out of power. With the 600AE packs, we were getting 9 to 10 minutes of flight.

Landings, even into Gerry's backyard, were easy; the plane slows down nicely. Because it's so light, even the absence of anything resembling a runway didn't prevent us from plunking it down without any damage. So if you want to have some fun at a really low cost—in time and in money—maybe a Ferias is for you.

**Addresses are listed alphabetically in the Index of Manufacturers on page 174.*



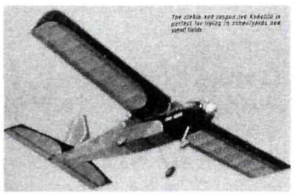
THE BEST OF MODEL AIRPLANE NEWS'

FULL-SIZE PLANS

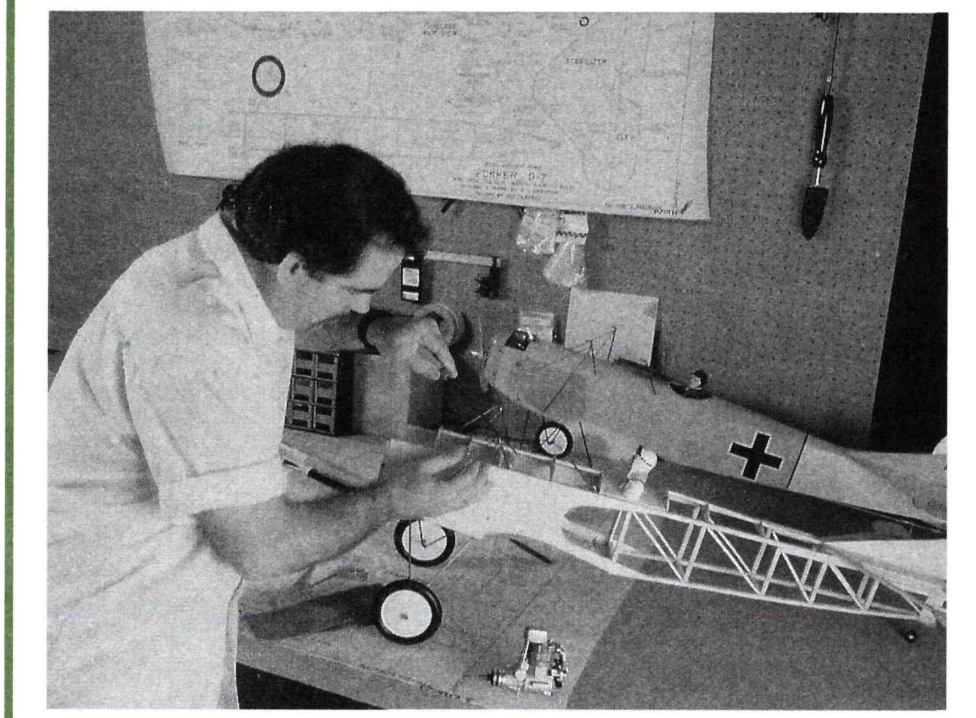
Here are the finest designs from the world's oldest model airplane magazine. There's something to suit everyone—trainers, scale and giant-scale birds, aerobatic planes, fun fliers, soarers, old-timers and more! Seventy years of design innovation have been combined in these pages to provide you with the ultimate scratch-builders' resource.

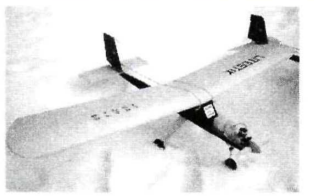
TRAINERS

FSP12782
Arrow Sport
This R/C sport-and-pattern trainer resembles a scale, mid-wing aircraft from the Golden Age. The design by Don Carkhuff features balsa/ply construction and a symmetrical airfoil. WS: 65 in.; L: 52 in.; engine: .40 to .60; 4 channels; 1 sheet; LD 3. **$24.95**

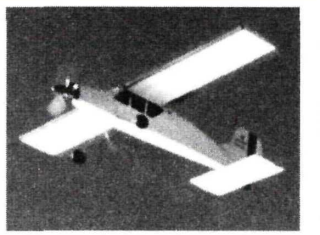


FSP11941
Kadetito
This is a half-size version of the popular Senior Kadet and Seniorita trainers. Built conventionally with balsa and ply and spruce spars and longerons, the Kadetito can be flown with an .049 to .074 2-stroke or easily converted to electric power. Plans show the side and top views of the fuselage and detailed wing, stabilizer and landing-gear views. WS: 39 in.; L: 31 in.; engine: .049 to .074; 2 sheets. **$14.95**

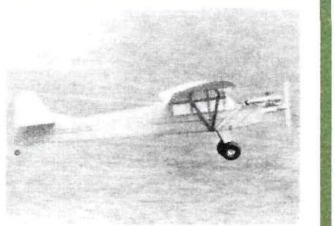




FSP07941
Litestik
A great first scratch-building project, George Wilson's Litestik is an easy-to-build primary trainer that can be upgraded to four channels by building an aileron-equipped wing. Cost, including plan, engine, radio and all building materials, should be approximately $250, or much less if your scrap box is well-stocked and your friends can help. WS: 59 in.; L: 42.5 in.; engine: .25 2-stroke; 1 sheet; LD 1. **$14.95**



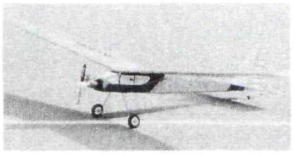
FSP05971
Paper Tiger
Designed by Roy Clough Jr., this sport/trainer monoplane is made mostly of inexpensive foam board. Its simple design and construction make it a good choice for a first-time scratch modeler. WS: 63½ in.; engine: .29 to .40 2-stroke; LD 1. **$19.95**



FSP06751
The Tutor
A sturdy, functional R/C trainer for beginner and sport flier, this design by Don Prentice features simple, conventional construction. WS: 70 in.; L: 46 in.; engine: .40 to .60; 4 channels; 1 sheet. **$19.95**

LEVEL OF DIFFICULTY Every plans set includes construction notes, and many include a difficulty rating to help you assess the challenge that faces you! **LD 1 = beginner** **LD 2 = beginner to intermediate** **LD 3 = intermediate to advanced** **LD 4 = advanced**

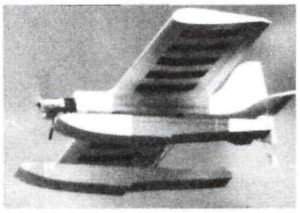
TRAINERS



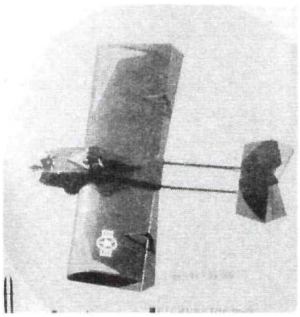
FSP09851
Tooter
A perfect trainer, this Jim Bigley design is easy to control and easy to build, yet it's enough to teach the essentials of good building techniques. For 3-channel (rudder, elevator, throttle) R/C, but could be adapted for ailerons. Perfect for electric conversion. WS: 70 in.; L: 36 in.; area: 600 sq. in.; engine: 10; 3 channels; 1 sheet; LD 1. **$19.95**

FSP03871
Twilighter
A basic aircraft for learning to build and fly R/C, this simple design is an inexpensive introduction into the hobby, and its simplicity won't reduce your fun. A great trainer designed by Randy Randolph. WS: 53 in.; L: 34.5 in.; area: 355 sq. in.; engine: .049; 2 or 3 channels; 1 sheet; LD 2. **$19.95**

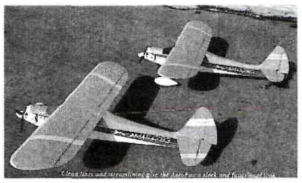
SPORT



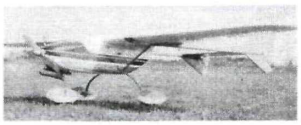
FSP10911
2 Ugly
The 2 Ugly is a different sport floatplane. It's a very short, coupled, almost flying-wing design, but it has good pitch stability. This easily built model is of balsa, plywood and foam, and it uses a .45 2-stroke or a .50 4-stroke. It may be called the 2 Ugly, *but it's a pretty picture flying off the* water. WS: 48 in.; L: 34.75 in.; 2 sheets; LD 2. **$14.95**



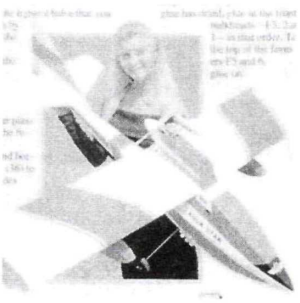
FSP10931
½A Stealth Sport
This model is inexpensive to build and fly. The wide-body fuselage can easily house standard-size radios, and its high-tech boom construction sets it apart from the rest. Any ½A engine will make the Stealth Sport a lively performer. WS: 32 in.; L: 24.5 in.; engine: .049 to a Tee Dee .051; 2 channels; 1 sheet. **$19.95**



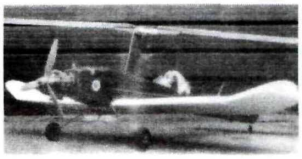
FSP12861
Aerofox
A beautiful light-plane-style R/C sport airplane that looks great and provides super performance. Design by George and Scott MacAleer features built-up balsa/ply construction, cabin-mounted wing and semisymmetrical airfoil. WS: 60 in.; L: 46 in.; area: 525 sq. *in.; engine: .40 to .45; 6 channels; 2* sheets; LD 3. **$24.95**



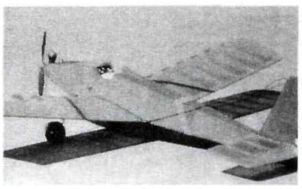
FSP10771
Air Master
Have fabulous R/C fun with an aerobatic machine that looks like the Cessna Push-Pull Skymaster! This Gerry Pronovost design results in an aerobatic plane that uses balsa/ply, built-up construction and techniques easy enough for novices. WS: 56 in.; L: 39 in.; engine: .40; 1 sheet; LD 2. **$14.95**



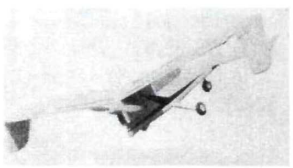
FSP06911
Aquastar Seaplane
Designed by Laddie Mikulasko, the Aquastar Seaplane uses a pusher engine and is intended for intermediate builder/fliers. Constructed of balsa and lite-ply, the 4-channel model is easy to build and fly, and it can be flown from land or water. Plans include a complete list of parts. WS: 70 in.; L: 59 in.; engine: .45 to .60 2-stroke glow. **$24.95**



FSP09773
Autogiro
An unusual but easy-to-build machine that is sure to set you apart from the crowd. From the fertile mind of Hal deBolt. WS: 48 in.; L: 43 in.; engine: .40; 4 channels; 1 sheet. **$14.95**



FSP07912
Bee-tween
Designed by Randy Randolph, the Bee-tween is a ½A sport plane that's perfect for first-time modelers. Compared with those of its high-wing brethren, its low-wing configuration is distinctive, yet it retains the stable flight characteristics of a trainer. WS: 37 in.; engine: .020 to .049ci 2-stroke; 2 (rudder and elevator-throttle) optional channels; 1 sheet. **$14.95**



FSP01811
Canada Goose
An interesting canard design for sport fliers, this Andy Lennon design has a relatively simple structure that gives it an uncomplicated look. Basic materials are balsa and plywood. WS: 49 in.; L: 34 in.; engine: .30 to .35; 5 channels; 1 sheet. **$14.95**

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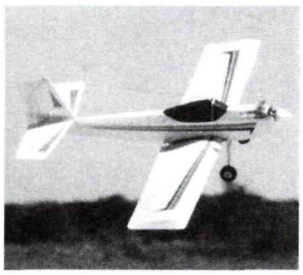
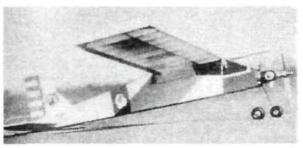
FSP03981
The Cheetah
Designed by Randy Randolph, the Cheetah is a great flying, good-looking, low-wing sport monoplane with plenty of performance for a .15-size airplane. Its all-wood construction using balsa and ply makes this a traditional building project with minimal skill requirements. The wing is constant chord, and the horizontal is built up. WS: 53 in.; L: 33.5 in.; 4 channels; 1 sheet; LD 2. **$14.95**

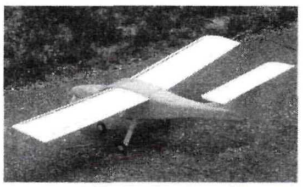


FSP03901
Chips
Another Randy Randolph sport design with a low-wing style, featuring fast, easy construction in balsa and ply. Its performance far outweighs the cost and building time, making it ideal for the intermediate flier. WS: 41 in.; L: 32 in.; area: 308 sq. in.; engine: .10 to .15; 4 channels; 1 sheet; LD 2. **$14.95**

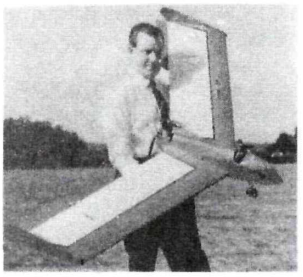


FSP08791
Coin Foo
This easy-to-build, fun-to-fly ½A R/C model is ideal for small fields. Simple, all-balsa design by Dean Swift. WS: 35.5 in.; L: 24.5 in.; engine: .049; 2 to 3 channels; 1 sheet. **$14.95**

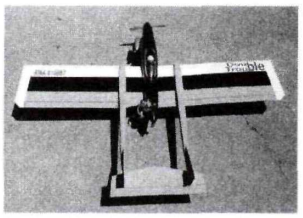
FSP04831
Crane
Andy Lennon's impressive STOL design uses flaps, leading-edge slats, spoilers and a variable-pitch propeller. This built-up wooden construction will certainly increase your understanding of high-lift devices and control-surface functions. WS: 60.5 in.; L: 45 in.; engine: .45; 6 channels; 2 sheets. **$24.95**



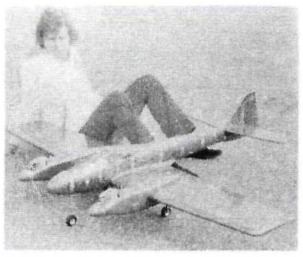
FSP08961
Crow STOL
Because of its high-lift-devices design, this model will take off and land in very short distances. Designer Andy Lennon has incorporated LE slots, full-span flaps and slot-lip ailerons. WS: 57.5 in.; L: 40.5 in.; engine: .46ci 2-stroke; 2 sheets. **$19.95**



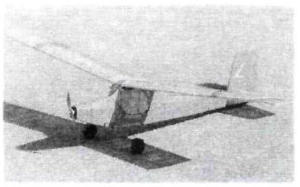
FSP01701
Dactyl
Couple great flying ability with a model airplane that's so unusual it will never lose its usefulness, and what do you get? This one-of-a-kind flying wing—robust, stable and easy to build. Built-up balsa design by Dennis Bryant. WS: 58 in.; L: 26 in.; engine: .40 to .60; 3 channels; 1 sheet. **$14.95**



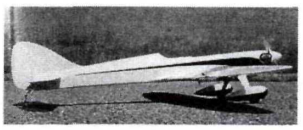
FSP11982
Double Trouble
This sport plane designed by Tony Newsom has both engines mounted on the same thrust line to eliminate torque steer, cancel extreme yaw characteristics if one engine dies and eliminate the concern of matching engines. WS: 51 in.; L: 40.5 in.; weight: 5.25 lb.; engines (2): .25 to .36; 1 sheet; LD 3. **$12.95**



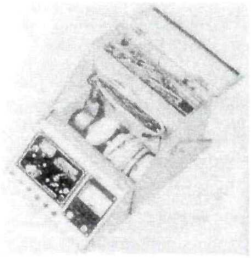
FSP05783
Duellist Mk.II
This extremely beautiful twin-engine plane is a first-rate flier for fun or for contests. Designed by Dave Platt, this fine machine is built up with balsa, plywood and hardwood, and it has fully sheeted surfaces. WS: 69 in.; L: 56.5 in.; engine: two .40; 1 sheet. **$19.95**



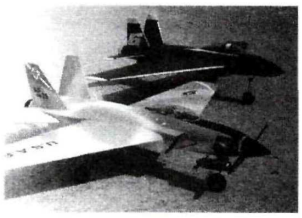
FSP05981
ECOL
This Randy Randolph design uses traditional balsa-and-ply construction and is designed around an AP 29 motor. It's a solid and stable flyer with above-average performance. It is intended to provide good touch-and-go fun from a grass field at a minimum of expense and effort. WS: 51 in.; L: 38.5 in.; area: 344 sq. in.; motor: AP 29; 3 channels; 1 sheet; LD 1. **$12.95**



FSP03862
Elliptic 40
A nifty-looking sport model that "does it all." This easy-to-build design by Alex Bouknight is a hot ticket for turn-around pattern, featuring built-up balsa/ply construction. WS: 58 in.; L: 51 in.; area: 653 sq. in.; engine: .40; 4 channels; 2 sheets; LD 2. **$24.95**



FSP11932
Field Box
Designed by Faye Stilley, this field box is compact and well-designed. The plans include a cut map, a drill map and a bill of materials. All the cuts can be made using one sheet of ¼-inch-thick plywood. It's easy to carry, and it has a mercury switch that turns on the power panel when the lid is opened. There's room for a battery, a starter, an ESV and other necessary tools. It can be carried with the lid open, and it also serves as a transmitter stand. LD 2. **$14.95**

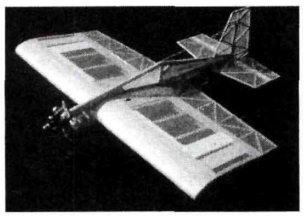


FSP09981
Foamcat
This Keith Sparks design is a glassed and sheeted foam model that looks like a jet but can be flown from a grass strip. The 3.5-pound model uses 3 channels for control and is topped off with a Sig canopy. WS: 46 in.; L: 35 in.; area: 358.75 sq. in.; engine: .25; 2 sheets; LD 3. **$19.95**

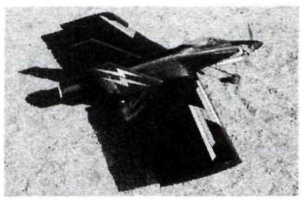
LEVEL OF DIFFICULTY Every plans set includes construction notes, and many include a difficulty rating to help you assess the challenge that faces you!

LD 1 = beginner
LD 2 = beginner to intermediate
LD 3 = intermediate to advanced
LD 4 = advanced

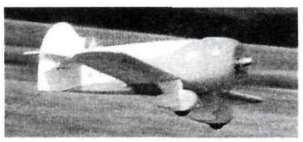
SPORT



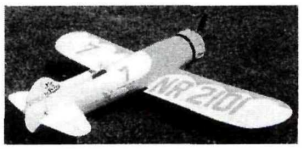
FSP02932
Fun Fly Hots
Here's the next generation of this well-known design by Dan Santich. The Fun Fly Hots is his answer to all the "swizzle-stick, fun-fly, no-personality types" that are flying today. With a flying weight of 2½ to 3⅓ pounds, the model's performance is sparkling, but it's a real pussycat at slow speeds. WS: 40 in.; L: 39 in.; engine: .25 to .40 2-stroke; 1 sheet. **$19.95**



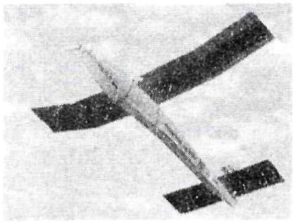
FSP10941
Future Shock
Designed by Bill Evans, Future Shock is the latest in the Similar Series of tailless aircraft. It has a balsa-and-ply fuselage and a foam wing, and the plans show two versions—electric-powered and glow-powered. Patterns for the foam wing's root and tip airfoils are also included, and foam wings are available from Soaring Research. WS: 56.5 in.; L: 32 in.; power: .25 motor or .40 glow engine. **$14.95**



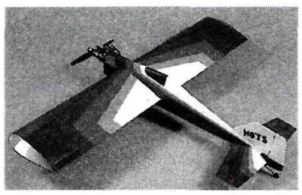
FSP02971
Gee Bee .20
The Gee Bee .20 is a sport-scale model of one of the most famous Golden Age racers of all time. It features simple, balsa-and-ply construction and excellent flight characteristics. WS: 41.5 in.; L: 27 in.; engine .20 to 25 2-stroke; 2 sheets; LD 2. **$19.95**



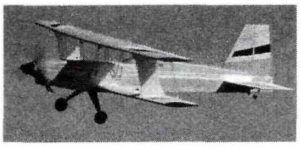
FSP12941
Gentle Gee Bee
Designed by Henry Haffke, this sort-a-scale long tail R-1/R-2 racer is easy to build and fly. The sport model uses traditional balsa and ply construction and has a fiberglass radial-engine cowl and wheel fairings available from Precision Fiberglass. WS: 58 in.; L: 43 in.; engine: .40 2-stroke; 1 sheet. **$19.95**



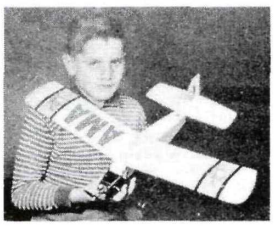
FSP02911
Goodyear F2G Racer
The F2G—a fun-scale version of the Goodyear F2G—is a fast, agile racer with a built-up fuse and foam-core wings. It flies well with any sport .40 engine, and it will run with most Quickie 500s when it has a high-performance engine. The construction article (2/91) includes tips on cutting foam-cores for the Corsair-style wings. Not for beginners; the airframe requires intermediate building skills. WS: 49.5 in.; L: 38 in.; power: .40 to .45ci; 4 channels; 1 full-size sheet; LD 2. **$14.95**



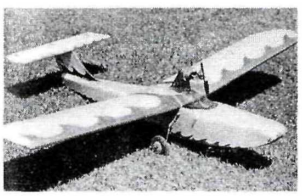
FSP04841
The Hots
A winning fun-fly R/C design by Dan Santich, this simple, quick-to-build, all-balsa model is an outstanding aerobatic performer but quite stable. WS: 48 in.; L: 29.5 in.; engine: .19 to .45; 4 channels; 1 sheet. **$19.95**



FSP07951
The Huskie 1200 Aerobatic Bipe
Designed by Phil D'Ostilio, this IMAA-legal sport aerobatics biplane offers exceptional performance. Made of balsa and plywood, it has sheeted-foam wings. The fuselage also has sheeted-foam panels for the turtle deck and the tail-control surfaces, and the hatch/canopy can be removed to allow access to the radio gear without having to remove the wings. WS: 60 in.; L: 61 in.; engine: Webra Speed 120; LD 3. **$19.95**

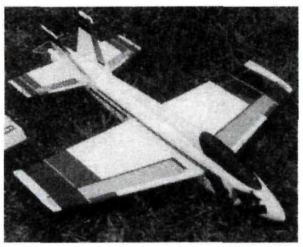


FSP07611
Lightning Bug
This tiny, .010-powered, rudder-only sport airplane designed by the master—Bill Winter—has a simple construction built up of sheet balsa and spars. WS: 27 in.; L: 19 in.; engine: .010; 1 channel; 1 sheet; LD 2. **$9.95**

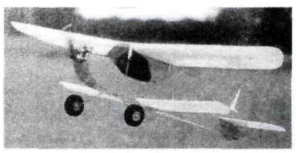


FSP06651
Li'l Swell
A tiny flying boat with an open, sheeted structure designed by the ROW specialist, Ken Willard. The airplane poses no building problems and makes a very stable flying boat. WS: 33 in.; L: 26 in.; engine: .020; 2 channels; 1 sheet. **$9.95**

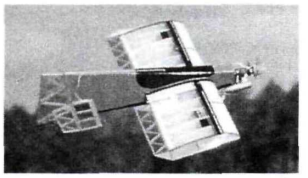
FSP11971
Lyka Jet
This low-tech, high-speed, jet-like sport plane was designed for a .40-size propped engine. Construction is foam wing-cores and a square, PVC-plastic downspout fuselage. The model can be built with or without landing gear, but the prototype (the fastest version) uses a wire landing skid and requires hand launching. WS: 50.5 in.; L: 43.5 in.; 4 channels; engine: .40 to .45 2-stroke; 1 sheet; LD 2. **$12.95**



FSP04951
Microjet II
This ½ A prop jet designed by Michael Van Staagen features sleek lines and impressive high-speed performance. Made of balsa and lite-ply, the Microjet II features conventional construction and makes use of an aluminum arrow shaft as the main wing spar. WS: 21.5 in.; L: 24.31 in.; 1 sheet. **$14.95**



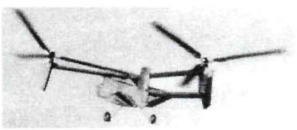
FSP09891
Miss Diamond
Randy Randolph designed this perfect little biplane that appeals to all R/C'ers. It has no rigging or struts, so it's quick and easy to construct. WS: 44 in.; L: 31.5 in.; area: 434 sq. in.; engine: .10 to .15; 4 channels; 1 sheet; LD 2. **$14.95**



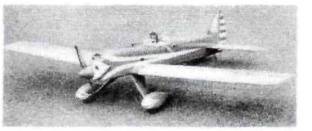
FSP05931
Notforsale
Blaine Stetler's unusual, fully aerobatic fun-fly airplane is competitive at sport fun flys. Its high-drag tail gives it superior directional stability at low speeds. With power, it's as fast as you want, but it's docile enough to be your second plane because it flies well at mild speeds. WS: 53 in.; L: 36.25 in.; engine: .32 to .46 2-stroke; 4 channels; 1 sheet. **$14.95**

FSP10841
Ol' Weird Harold
A gentle 4-stroke aircraft that can serve as an aerial photography platform. Built-up design by Dave Burgess. WS: 80 in.; L: 52 in.; engine: .90 4S; 5 channels; 2 sheets; LD 2. **$29.95**

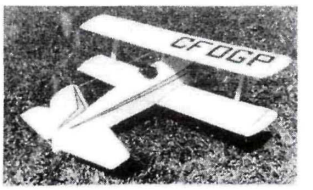
FSP03881
Osprey
This ½A all-balsa cabin biplane is easy to build but incorporates unique design features such as easy-to-duplicate, molded balsa wings and a slide-in radio and engine tray that provides easy access to all equipment. Wing loading is perfect for slow, relaxed flying. This Joe Wagner design is a sure hit for small fields. WS: 30 in.; L: 26 in.; engine: .049; 2 channels; 1 sheet. **$14.95**



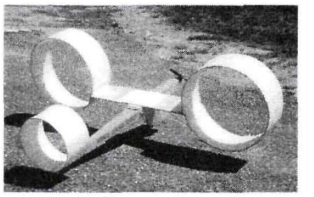
FSP03931
Osprey Autogyro
Designed by Andrew Fanning, this twin-rotor model is perfect for flying out of very small areas. It looks realistic in the air and features easy balsa construction. Plans include simple drawings for vacuum-forming tool. WS: 66 in.; L: 26 in.; engine: .15 to .20 2-stroke. **$14.95**



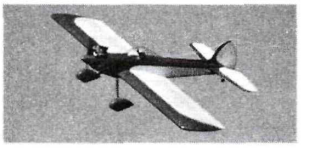
FSP08871
Peashooter
This low-wing sport trainer has an outstanding scale-like appearance, setting this design apart from other sport planes. An all-balsa, built-up airplane for 2- or 4-stroke engines designed by Henry Haffke. WS: 56 in.; L: 43 in.; engine: .40 to .45; 4 channels; 1 sheet. **$19.95**



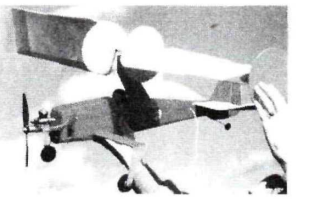
FSP07772
Prentice Baby Bipe
This nifty little biplane is quite light and very maneuverable. Don Prentice design features easy construction and outstanding flight performance. WS: 32 in.; L: 32 in.; engine: .23; 4 channels; 1 sheet. **$14.95**



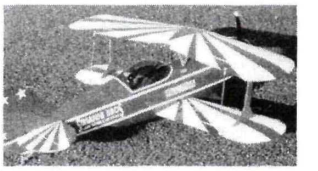
FSP03961
Ringer
Designed by Roy L. Clough Jr., this unconventional annular-wing model is built using 14-inch-diameter embroidery hoops, hardwood dowels and balsa. WS: 44 in.; L: 39 in.; engine: .049; 1 sheet. **$14.95**



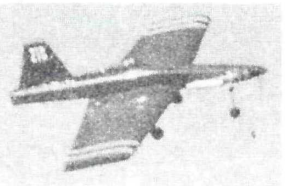
FSP08971
The Ringmaster
Designed by Nick Ziroli Sr., this 30-percent-enlarged, R/C conversion of the 1951 Harry Williamson control-line stunt design is conventional balsa and ply, and the wing has a symmetrical airfoil and no dihedral. WS: 54 in.; L: 39 in.; engine: .40 to .50 2-stroke, .45 to .60 4-stroke; 4 channels; 1 sheet; LD 2. **$9.95**



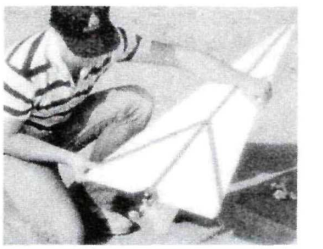
FSP07931
Rotorplane
This 2-channel rotorplane, designed by Roy Clough Jr., breaks new ground by using wings that spin around their lengthwise axis. In the air, it handles much the same as an autogyro. The rotor wings provide effective dihedral, enabling rudder-only control. Wow your buddies with this experimental aircraft. WS: 37.5 in.; L: 28 in.; power: Cox Medallion .09 spinning a Cox black nylon 7x3.5 prop; 1 sheet; LD 1. **$14.95**



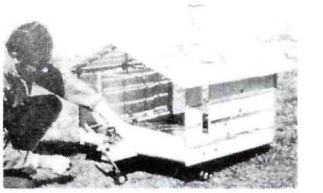
FSP03951
S2B Pitts Special
This ¼-scale sport model designed by Mark Sirianni features conventional balsa and plywood construction. The wings have fully symmetrical airfoils, and the model is equipped with four ailerons. WS: 61 in.; engine: .90 to 1.20; 3 sheets. **$24.95**



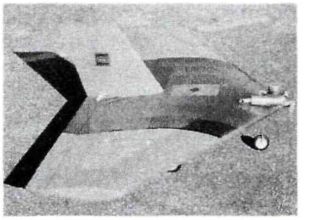
FSP07911
The Shooter
Bill Evans' Shooter can be flown fast or slowed to glider flying speed without tip-stalling. This tailless design uses "elevon" control for both elevator and aileron inputs, which can be achieved either with a mechanical sliding tray (shown on plans) or with computer mixing. WS: 50 in.; L: 38 in.; area: 574 sq. in.; engine: .40 2-stroke; 1 sheet; LD 1. **$14.95**



FSP07881
Skydart
This interesting design features all-wood construction and requires only a ½A engine for power. Although it's easy to build, it isn't recommended for absolute beginners because it's difficult to see when it's airborne. The Mark McCray design is perfect for small-field flying. WS: 20 in.; L: 41 in.; engine: .049; 2 channels; 1 sheet. **$14.95**



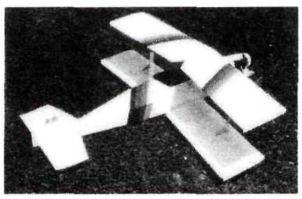
FSP04713
Snoopy's Doghouse
A true collector's item—the original flying Snoopy's Doghouse designed by Al Signorino in balsa and hardwood. This wonder actually flies! WS: 24 in.; L: 25 in.; engine: .60; 1 sheet. **$19.95**



FSP12842
Stingray Delta .40
Steve Gray's rugged, snappy design is easy to build and delivers sizzling aerobatic performance. WS: 56 in.; L: 26 in.; engine: .35 to .45; 1 sheet. **$19.95**

SPORT

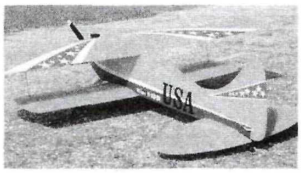
FSP02861
Super Hots
This .40- to .60-size Dan Santich fun-fly model is the king of the sky. Plans feature full-size patterns for quick, easy construction out of balsa and ply. WS: 54 in.; L: 51 in.; area: 702 sq. in.; engine: .40 to .61; 4 channels; 1 sheet; LD 2. **$19.95**



FSP10871
Super Hots Bipe
A two-wing version of the fun-fly plane of the '80s and '90s, this Floyd Manly design features simple construction, fantastic slow-flight qualities and aerobatic capabilities suited to a circus. Relatively easy to build in the Hots format. WS: 47 in.; L: 50.5 in.; area: 854 sq. in.; engine: .50 to .60; 4 channels; 2 sheets; LD 2. **$24.95**

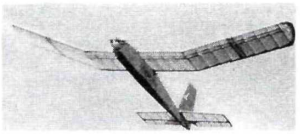
FSP11801
Super Streak
This advanced sport pattern airplane designed by John Shenk for Quadra power is a fine aerobatic performer. Impressive aircraft features extensive built-up construction in a variety of wooden materials. WS: 87 in.; L: 69.5 in.; area: 1,262 sq. in.; engine: 1.8+; 4 channels; 2 sheets; LD 3. **$24.95**

FSP09931
The Swift
Andy Lennon's Swift is a low-drag, flap-equipped sport design that offers unlimited vertical performance, a wide speed envelope, short-takeoff-and-landing capability and numerous clever design innovations. WS: 61.5 in.; engine: .46 2-stroke; 1 sheet. **$19.95**

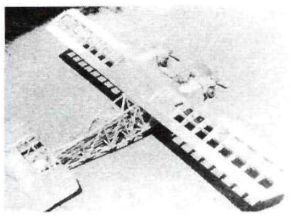


FSP03962
Swiss Bipe
Another classic from Hal deBolt, this model is a very stable sport biplane that's capable of sport aerobatics. WS: 53/58 in.; L: 39 in.; engine: .049; 1 sheet. **$19.95**

FSP01921
Tadpole
The Tadpole is a state-of-the-art, fun-fly competition flier with a unique double-reflex airfoil to enhance slow-flight performance. It's built of balsa and plywood, and the tail boom is a fiberglass tube. Its very large control-surface deflections, light wing loading and computer mixing of the control surfaces make this light plane very maneuverable. Not for beginners. WS: 46.5 in.; L: 40 in.; engine: .30 to .40 2-stroke; 4 channels with 5 servos; 1 full-size sheet; LD 2. **$19.95**

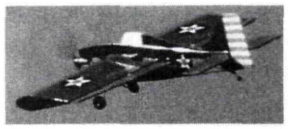


FSP12871
Twiliter II
An easy-going, slow-flying sport model by Randy Randolph. Economical operation, easy balsa construction and good flight qualities make this plane ideally suited to the R/C newcomer. WS: 66 in.; L: 42 in.; engine: .10 to .15; 3 channels; 1 sheet. **$19.95**

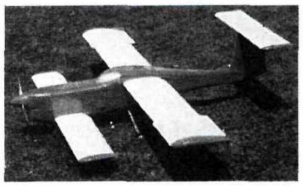


FSP09961
Twin Trainer TT-1
This design by Roy Day uses standard materials and construction techniques so it's an inexpensive way to work up to those large-scale twins, and it's a good flier. WS: 72 in.; L: 44.75 in.; area: 600 sq. in.; engine (2) .25 2-stroke; 2 sheets; LD 2. **$14.95**

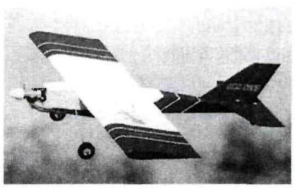
FSP08941
Vertigo
Build Tom Hunt's vertical takeoff and landing (VTOL) with off-the-shelf, commercially available parts. Plans include servo-mixing diagrams and show every detail needed to build an airplane that takes off like a helicopter, hovers, transitions to forward flight, and then transitions back to hover for a vertical landing. WS: 65.83 in.; L: 58.19 in.; engine: O.S. .46 VRDF in homemade "prop fan" nacelle; 3 sheets. **$29.95**



FSP03970
The WILDest CAT
This fun-to-fly profile model is a stand-way-off model of the Grumman Wildcat. Built with traditional materials (balsa, ply and lite-ply and music-wire landing gear), the model has wonderful slow-speed performance and is very aerobatic. All radio gear is placed within the wing, and the profile fuselage makes engine, landing gear and fuel tank installation a breeze. WS: 45.5 in.; L: 43 in., engine: .40; 4 channels; LD 1. **$14.95**

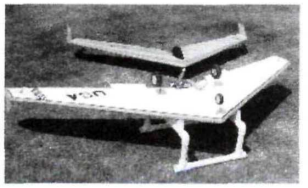


FSP01961
Wild Goose
An Andy Lennon design, the Wild Goose has three lifting surfaces and slotted flaps on the canard and on the wing. It uses the NASA "safe-wing" LE droop design on the aft wing. The model is built using balsa and plywood construction methods. WS: 56.625 in.; L: 43.75 in.; area: 787 sq. in.; engine: .46; 2 sheets; LD 2. **$14.95.**

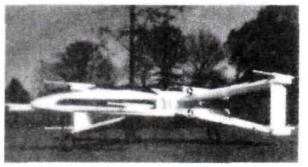


FSP04911
Wild Thing .40
Designed by Tom Stryker, the Wild Thing .40 has a short wingspan for fast roll rates, and its 600-square-inch wing area and unique airfoil make it practically stallproof. It flies extremely well at low speeds and can practically hover in a light breeze. For intermediate builders/fliers. WS: 48 in.; L: 41 in.; engine: .35 to .45ci 2-stroke; 1 sheet. **$19.95**

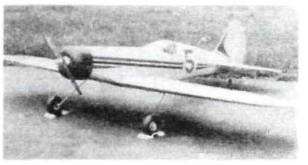
ELECTRICS



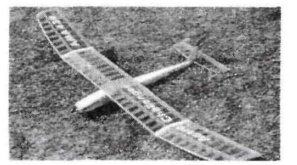
FSP03941
The Winglet
The Winglet is a sport-flying wing powered by a .40 engine in a pusher configuration. It has wingtip-mounted vertical fins and clamshell drag-control surfaces. Built using balsa, plywood and spruce, the construction is uncomplicated, well-thought-out and strong. WS: 74 in.; L: 32 in.; engine: .40 2-stroke; 4 sheets. **$29.95**



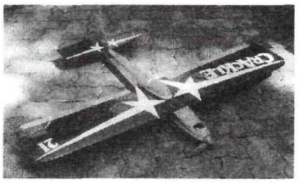
FSP06841
X-Wing Fighter
This unconventional aircraft has a futuristic design but is simple to build. The Gene Knight design features sheet-balsa construction. WS: 36 in.; L: 40 in.; engine: .25 to .45; 4 channels; 1 sheet. **$19.95**



FSP10811
The Yellow Kid
Here's an R/C sport model of moderate size for pattern maneuvers. Its all-balsa structure is quite easy to build. Designed by Bruce Knox. WS: 44 in.; L: 37 in.; area: 390 sq. in.; engine: .25 to .30; 4 channels; 1 sheet; LD 2. **$14.95**

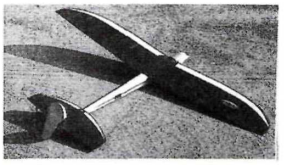


FSP06851
Astro Challenger
A Nats-winning electric-powered glider that's simple to build and easy to fly—perfect for silent schoolyard fun, yet very competitive. This design by Bob Boucher features all-balsa, open-framework construction. WS: 70 in.; L: 37.5 in.; area: 630 sq. in.; motor: .05 ; 3 channels; 1 sheet; LD 2. **$19.95**



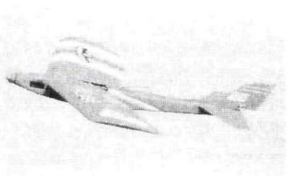
FSP01981
The Crackle
Designed by Steven Pauley, the Crackle is an electric powered, 05-size, sport plane that features built-up balsa and ply construction. Its lightweight construction allows flights of more than 7 minutes and the ability to thermal for extended times while using a 7-cell battery pack. The Crackle is intended for the intermediate builder/flyer.WS: 46 in.; weight: 42 to 48 oz.; power: 05 motor; LD 2; 1 sheet. **$9.95**

FSP12921
de Havilland Hornet
Designed by Roy Day, this scale, electric-powered, WW II twin-engine fighter is built of balsa and plywood; foam and papier-maché form the nose cone and engine nacelles. Two AstroFlight geared 05 motors and 14, 1700mAh SCR cells provide scale-like performance. WS: 58 in.; L: 49 in.; power: (2) 05 geared motors; 4 channels; 2 sheets. **$19.95**



FSP04941
Die Schwinge
Designed by Hal deBolt, the all-wood, electric-powered Schwinge (German for "wing") is built using conventional construction techniques. The easy-to-build, elliptical wing has two-piece ribs and a 3/32-inch-thick, one-piece sheet spar. The full flying rudder ensures excellent yaw control in all conditions. WS: 60 in.; L: 45 in.; power: .05 geared motor; LD 2. **$14.95**

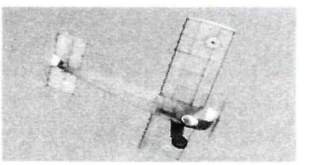
FSP10951
Dornier Electric 335 Twin
This 1/8-scale, all-balsa masterpiece is large yet light (10 lb., 2 oz.) and has brisk performance when it's run on 28, 1400mAh SCR cells. Plans show retract installation. WS: 70.5 in.; area: 1,006 sq. in.; motor: (2) geared .15G; 3 sheets; LD 3. **$29.95**



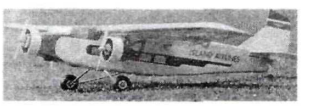
FSP05911
EZee Wizard
This swept-wing, electric, .05-powered design has an airfoil that gives the best possible speed range. The Wizard has no aileron, and it needs none for exceptional roll rates. Great for sport aerobatics and electric pylon racing. L: 34 in.; motor: Astro .05 cobalt or FAI .05; 3 channels; 1 sheet. **$14.95**

FSP07971
F6F Hellcat
This electric Hellcat is a Speed 400-powered sport-scale model that's easy to build and fly. The wings are sheeted foam, and the rest of the aircraft is traditional balsa-and-ply construction. WS: 30 in.; 1 sheet; LD 2. **$14.95**

FSP01991
F8F Bearcat
This Speed 400 model was CAD-designed by Jim Ryan and features a thinned Clark-Y airfoil, foam-core wing and simple balsa construction. It is true to scale and, with a weight of only 18 ounces, is remarkably aerobatic. WS: 30 in.; L: 22.25 in.; motor: Speed 400; 3 channels; 1 sheet; LD 3. **$14.95**



FSP11981
Farman Moustique
Designed by Don Srull, this electric micro-R/C model is perfect for no-hassle, backyard flying. Its lightweight construction allows flights of more than 5 minutes. The model uses throttle and rudder control with elevator as an option. WS: 26 in.; L: 21.5 in.; weight: 5 oz.; power: WES-Technik 2.4 geared motor; 1 sheet; LD 2. **$12.95**

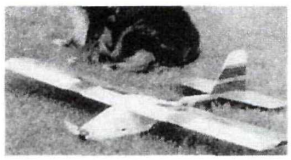


FSP12772
Ford Tri-Motor A.T.5-Tin Goose
This semi-scale model offers a choice between three electric or internal-combustion engines. Straightforward balsa construction in a design by Dennis Tapsfield. WS: 60 in.; L: 39.5 in.; power: (3) .049 or .05. **$19.95**

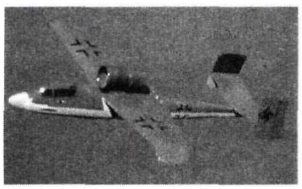
LEVEL OF DIFFICULTY Every plans set includes construction notes, and many include a difficulty rating to help you assess the challenge that faces you!

LD 1 = beginner
LD 2 = beginner to intermediate
LD 3 = intermediate to advanced
LD 4 = advanced

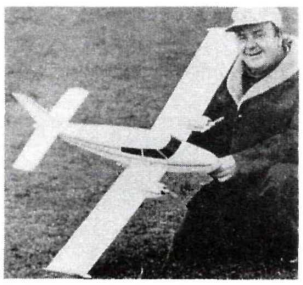
ELECTRICS



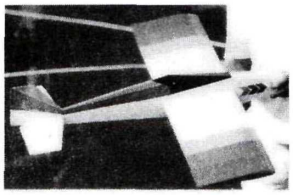
FSP11911
Fred's Special
Designed by electrics aficionado Vernon Williams, this plan can be built as an aerobat or trainer and features a modified Eppler 193 airfoil, built-up construction and 3- or 4-channel control. It uses a .05 ferrite, .05 or .15 cobalt, or Astro FAI .15 cobalt racing motor. WS: 46.5 in.; L: 32 in.; 2 sheets; LD 2. **$14.95**



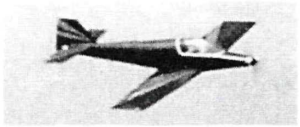
FSP05961
Heinkel He-162 Salamander
Powered by a Kress Jets Electro Jet ducted fan, this balsa-and-plywood sport-scale model is made using conventional building techniques. The fuselage is strip-planked, and the wing has a flat-bottom airfoil. WS: 43 in.; L: 42 in.; power: electric ducted fan; 1 sheet. **$14.95**



FSP05771
Italair F20 Pegasus
An electric-powered semi-scale Italian sport plane designed for Astro .05 electric motors, it can be adapted for two .051 engines. Design by Dennis Tapfield. WS: 51 in.; L: 37 in.; motor: (2) .05; 4 channels; 1 sheet. **$14.95**

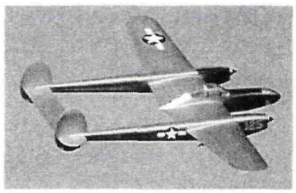


FSP08891
'Lectric Hots
This excellent sport flier is easy to build with conventional materials. Design by Tom Stryker. WS: 37 in.; L: 35 in.; motor: .05; 4 channels; 1 sheet. **$14.95**

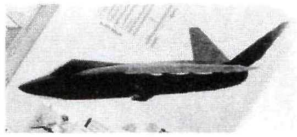


FSP12971
MicroSport
The MicroSport is a Speed 400-powered electric sport-scale model that's easy to build and fly. The wings are sheeted foam, and the rest of the aircraft is traditional balsa-and-ply construction. WS: 29 in.; 1 sheet; LD 2. **$14.95**

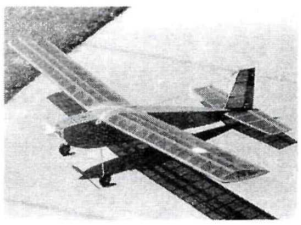
FSP05951
Minnwatt
Designed by Randy Randolph, the Minnwatt is a ½A-size electric elevator/rudder ship that's perfect for flying in limited spaces. Minnwatt features light, all-wood construction and a polyhedral wing, and it flies with a 36W or 50W motor on five, 600mAh cells. WS: 51 in.; area: 330 sq. in.; 1 sheet; LD 1. **$14.95**



FSP01971
P-38 Lightning
The electric P-38 Lightning is a G400-powered sport-scale model that's easy to build and fly. The wings are sheeted foam, and the rest of the aircraft is traditional balsa-and-ply construction. WS: 50 in.; motors: G400; 2 sheets; LD 2. **$19.95**

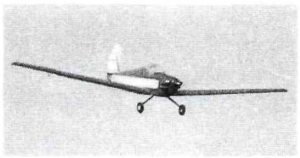


FSP11931
Stealth-E
Jeff Holan's hand-launch, electric, ducted fan has all-balsa construction with a 1/64-inch-ply, formed-wood fan shroud. At 35 oz., it's a stable flier with a full-power duration of about 2½ minutes. WS: 36 in.; L: 38.5 in.; area: 360 sq. in.; motor: .05 12-turn quad (with ball bearings, wet magnets and advanced timing turning cut-down props); 1 sheet; LD 3. **$19.95**

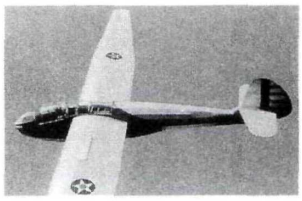


FSP02822
Yardbird
An electric-powered R/C plane of very simple construction, this all-balsa plane is forgiving when airborne and ideal for operating off small fields. Designed by Randy Randolph. WS: 49.25 in.; L: 34.5 in.; motor: .05; 3 channels; 1 sheet. **$14.95**

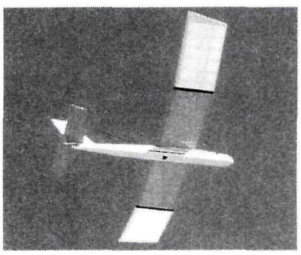
GLIDERS



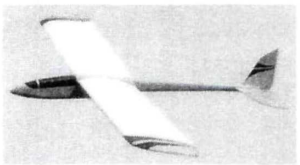
FSP11811
Schweizer 1-30
This "silhouette scale" engine-powered glider is an unusual design by Dr. D.B. Matthews. The all-balsa airframe is not difficult to build; a sturdy model with outstanding flight characteristics. WS: 78 in.; L: 39 in.; area: 648 sq. in.; engine: .19 to .25; 4 channels; 1 sheet; LD 3. **$19.95**



FSP04842
Schweizer TG-2
The original of this magnificent scale sailplane was used for primary training by the U.S. Air Force in WW II. Design by Steve Moskal features built-up construction. WS: 126 in.; L: 62.5 in.; 3 channels; 2 sheets. **$29.95**

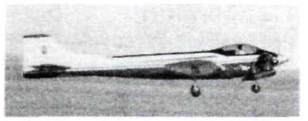


FSP07981
Sun Rider
Designed for first-time builders and fliers, this easy-to-build, 2-channel glider uses balsa and plywood throughout and has a three-panel wing with a flat center section. With some modification to the nose, an electric motor or a small glow engine could be used to power it. WS: 72 in.; L: 40 in.; 2 channels (rudder and elevator); 1 sheet; LD 1. **$12.95**

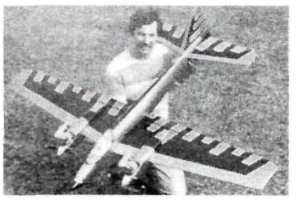


FSP06871
Zinger
This Bob Cook design is a hand-launched, high-performance glider that incorporates ailerons. It's easy to transport, quick to build and perfect for the budget-minded modeler. WS: 60 in.; L: 31 in.; area: 400 sq. in.; 1 sheet; LD 2. **$14.95**

PATTERN

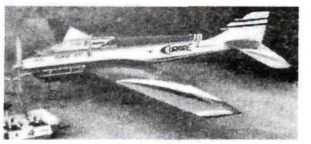


FSP03762
Atlas
This world-champion pattern airplane by Wolfgang Matt was designed specifically to win. Construction follows typical pattern practice: built-up surfaces and a sheet-wood fuselage shaped with blocks. WS: 69 in.; engine: .60; 5 channels; 2 sheets. **$24.95**

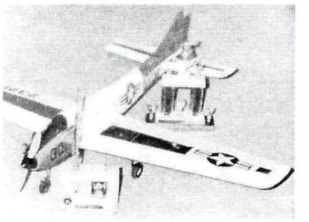


FSP05821
The Big Apple
This twin .40-powered pattern plane features built-up wooden construction. The Dick Sarpolus design provides pattern with performance and sport flying with zest. WS: 72 in.; L: 57 in.; engine: (2) .40; 4 channels; 1 sheet. **$19.95**

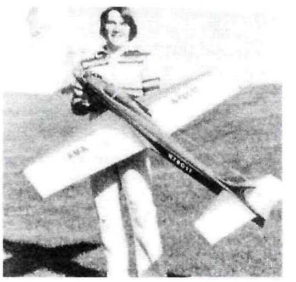
FSP02651
Crusader
Dr. Ralph Brooke presented his classic design for pattern competition nearly a quarter-century ago. It's both an all-balsa project for the newcomer to aerobatics and a bit of nostalgia that will stimulate the vintage pattern enthusiast. Either way, this design is truly timeless. WS: 68 in.; L: 42 in.; engine: .60; 5 channels; 2 sheets. **$19.95**



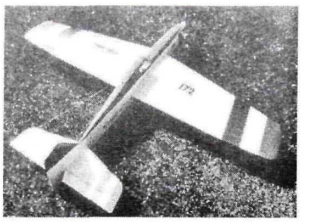
FSP12761
Curare
Nearly 15 years old, this world-famous pattern plane designed by Hanno Prettner is still seen in pattern contests; its anhedral stab is one of a kind. Construction of wood and foam is in a typical pattern style, but it features many rare and unusual design elements. WS: 60 in.; L: 56 in.; engine: .60; 5 channels; 1 sheet. **$19.95**



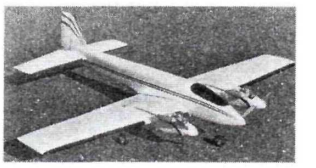
FSP10701
Cutlass
Don Coleman's pattern airplane combines military style with high performance. Built of balsa and foam in a typical pattern fashion. WS: 62 in.; L: 51 in.; engine: .60; 4 to 5 channels; 1 sheet; LD 3. **$19.95**



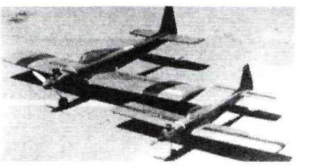
FSP09783
Deception
A Jim Kimbro design, it uses the usual balsa/foam techniques. WS: 63 in.; L: 59.5 in.; engine: .60; 5 channels; 1 sheet. **$19.95**



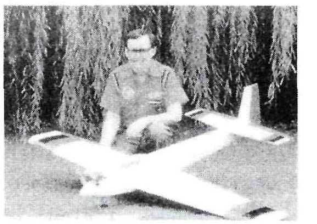
FSP08693
Eyeball
This is the radical Art Schroeder design that started the trend to mid-wing airplanes. This consistent contest winner is easily built and features a foam wing and slab-side fuselage. WS: 60 in.; L: 43 in.; engine: .60; 4 channels; 1 sheet; LD 3. **$14.95**



FSP09802
Fifty Caliber
This twin-engine design features easy construction and is designed by Dick Sarpolus. WS: 58 in.; L: 49.5 in.; area: 550 sq. in.; engine: (2) .25; 4 channels; 1 sheet; LD 3. **$19.95**

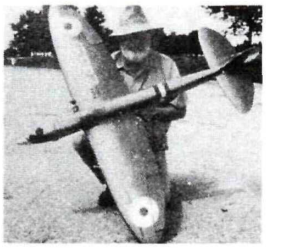


FSP10681
Flea Fli
This scaled-down version of Phil Kraft's famous Kwik-Fli retains all the fine characteristics of its big brother while remaining easy to construct. All-balsa structure is similar to that of the bigger airplane. WS: 38.75 in.; L: 34 in.; engine: .19; 4 channels; 1 sheet; LD 2. **$14.95**



FSP11841
Kaos 90
A 25-percent enlargement of Joe Bridi's original design by Dewey Newbold and James Cumming. WS: 73.5 in.; L: 69 in.; engine: .90; 4 channels; 2 sheets. **$24.95**

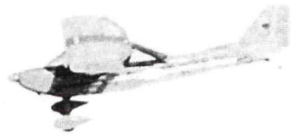
FSP02681
Kwik-Fli Mk. III
Unquestionably the single most popular pattern airplane of all time. Although its plans were first published in *Model Airplane News* in 1968, this remarkable airplane is built and flown even today. Construction features slab side fuselage and a D-tube, built-up wing; this Phil Kraft design is eligible for VR/CS events. WS: 60 in.; L: 52 in.; engine: .60; 4 channels; 2 sheets. **$19.95**



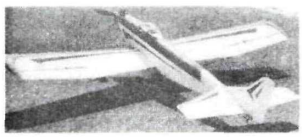
FSP02772
L'Oiseau de Paradis
Designed by Charles Perry for fun and for contests. Constructed of balsa and plywood. WS: 57 in.; engine: .40; 5 channels; 1 sheet. **$19.95**

FSP06733
Mach I
Norm Page's Mach I cut a wide swath in 1973 when its many pattern wins won it a place on the U.S. World Team; it could easily do so again today. Employs typical pattern building techniques in balsa and foam. WS: 62 in.; L: 56 in.; engine: .60; 5 channels; 1 sheet. **$19.95**

PATTERN

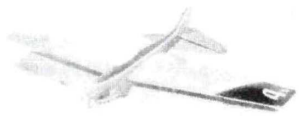


FSP02961
McCessna
Designed by Ernie Heyworth, this model has gentle flying characteristics. Its basic construction is of balsa and plywood, and it can be flown with either glow or electric power sources. WS: 83 in.; L: 50 in.; area: 120 sq. in.; power: electric 40 geared; Enya .46 or Saito .80; 2 sheets; LD 2. **$19.95**



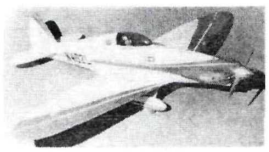
FSP06601
Orion
This Ed Kazmirski design is the granddaddy of full-house pattern airplanes; still a potent performer and ideal for VR/CS events. Constructed of conventional sheet-balsa fuselage and built-up wing. WS: 64 in.; L: 46 in.; engine: .60; 4 channels; 2 sheets. **$14.95**

RACING

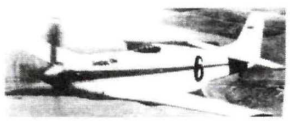


FSP02733
Bob Cat
A world-record holder, FAI pylon racer with some really innovative design elements. This Bob Violett design is built of balsa, ply and foam. WS: 57 in.; L: 43 in.; engine: .40; 4 channels; 1 sheet; LD 4. **$14.95**

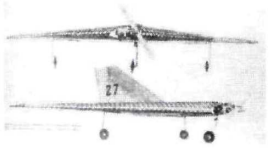
FSP04691
Continental 600
This good-looking Formula 2 racer designed by Bob Noll is built with fully sheeted surfaces. Its flying qualities are so good that this airplane doubles as a sport flier. WS: 58 in.; L: 42 in.; engine: .40; 4 channels; 1 sheet; LD 3. **$14.95**



FSP12771
Estrellita/Stinger
Formula One pylon racing at its very best! You can win with either version of this Bob Owens design. Constructed of balsa and foam. WS: 50 in.; L: 41 in.; engine: .40; 4 channels; 1 sheet. **$19.95**

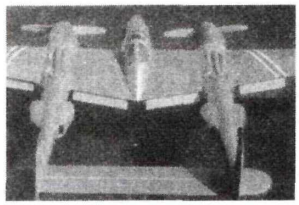


FSP04832
P-51 Reno Racer
Second in our easy-to-construct racing series, this aircraft is a perfect companion to the T-6 (FSP04821) and a great project for simplified racing fun. Design by Rich Uravitch uses all-balsa construction. WS: 43.5 in.; L: 32.5 in.; engine: .15 to .19; 4 channels; 1 sheet; LD 2. **$19.95**

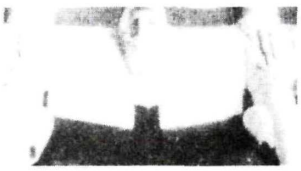


FSP06641
Sidewinder Pylon Racer
Originally designed for the old AMA single-plane pylon racing, this model remains an interesting R/C sport plane. The Dale Nutter design has a remarkable delta configuration. Easy construction of conventional materials make it highly maneuverable. WS: 44 in.; L: 48 in.; engine: .19+; 3 channels; 1 sheet. **$14.95**

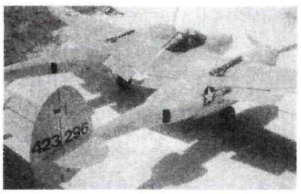
SCALE



FSP07922
2-Position Fowler Flaps
This Fowler flap design by Robert Almes is a breakthrough for giant-scale modelers who want true Fowler-flap actuation based on simplified pneumatic mechanics. This plan shows the two-position (retracted, extended) flaps designed for a 1/5-scale P-38 (flap cord of 4 inches). It can be adapted to any appropriate airframe. 1 sheet; LD 2. **$14.95**



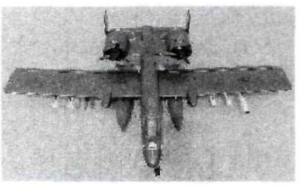
FSP06932
3-Position Fowler Flaps
This Fowler flap design by Robert Almes is a breakthrough for giant-scale modelers who want true Fowler-flap actuation based on simplified pneumatic mechanics. This plan shows the three-position (retracted, half and full) flaps designed for a 1/6-scale P-38. It can be adapted to any appropriate airframe. 1 sheet; LD 2. **$14.95**



FSP03972
Servo-Operated Fowler Flaps
This new, improved Bob Almes design for 1/6-scale Fowler flaps uses a new flap hinge block that eliminates 16 items from the original parts list. **$14.95**

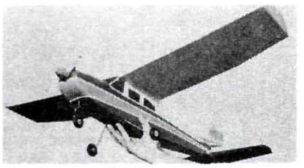
FSP09872
A6M2-N Rufe Conversion
Convert your Top Flite, Royal Zero or, indeed, any .60 Zero to an A6M2-N Rufe for ROW Operation. Plans include main- and tip-float construction plus wingtip and tail-feather modifications. Designed by Ed Westwood. 1 sheet; LD 2. **$19.95**

FSP08922
A-10 Warthog
This sport-scale, ½A-powered A-10 twin design by John Kidd is a stable flier on only one engine and features a box fuselage and simple, built-up wings. This easy-to-fly, low-cost warbird is powered by two Cox TeeDee (or comparable) engines (housed in 2-liter-soda-bottle nacelles) that turn 5x3 props cut down to 4 inches. WS: 56 in.; L: 45 in.; engine: ½A or larger; 3 sheets. **$19.95**

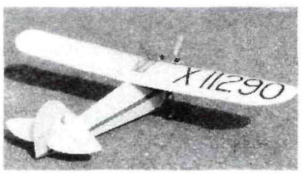


FSP05941
A-10 Warthog Tank Buster
This sport-scale jet has a built-up balsa fuselage (box construction), plywood-skinned, three-panel foam-core wing and balsa-sheet tail parts. Instead of expensive ducted-fan units, it uses conventional engines with propellers. WS: 48 in.; area: 45 sq. in.; engine: (2) .15 to .25 2-stroke; 4 channels; 2 sheets; LD 2. **$19.95**

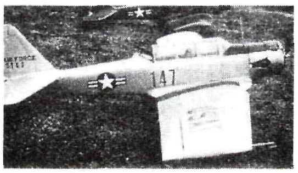
FSP10971
Acro I
Designed by Roy Day, the Acro I is a ¼-scale aerobatic model of a full-size homebuilt, kit plane. It has a built-up balsa and ply fuselage and a foam-core wing. It utilizes a "blended" semisymmetrical airfoil with a NACA 4415 airfoil at the tip and a NACA 0015 at the root. Slow-flight characteristics are very good. WS: 65 in.; 4 channels; engine: 70 to .91 4-stroke, .60 to .75 2-stroke; 2 sheets; LD 2. **$19.95**



FSP12651
Aermacchi Lockheed
This semi-scale, easy-to-build, Jess Krieser R/C design was originally intended for rudder-only control, but it's easily adapted to elevator, throttle and rudder. It's extremely stable and ideal for novices. It features a sheet-balsa fuselage and built-up flight surfaces. WS: 42 in.; L: 31.5 in.; engine: .09 to .15; 1 channel; 1 sheet. **$19.95**

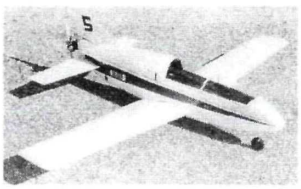


FSP06961
Aeronca C-1 Scout
Powered by a small 4-stroke, this easy-to-build scale aerobatic model designed by Phillip Kent performs very well. Balsa and plywood are used throughout, and the wing panels are removable. The model has functional rigging wires and should not be flown without them. WS: 61.5 in.; L: 41.5 in.; engine: .26 4-stroke; 2 sheets. **$19.95**

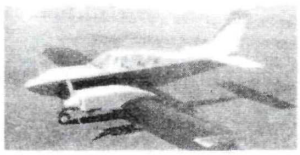


FSP05702
AT-6 Texan
This airplane is superb both in appearance and flight. Design by Don Carkhuff and Ed Price features extensive construction in balsa, ply and hardwood. WS: 60 in.; L: 42 in.; engine: .60; 4 to 6 channels; 1 sheet; LD 3. **$19.95**

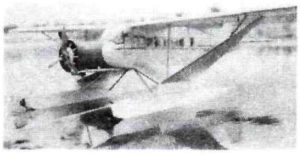
FSP07742
Avro Vulcan
This excellent, R/C, standoff-scale model of the famous British bomber features a rear engine in a pusher configuration. This Matthew Steele design is all built up of balsa and ply. WS: 46 in.; L: 39 in.; engine: .40; 3 channels; 1 sheet. **$14.95**



FSP09753
Bede BD-5
A fine semi-scale, home-built design by Fred Reese. This is a "fun" machine that's easy to build. WS: 36 in.; L: 25 in.; engine: .049; 2 channels; 1 sheet. **$14.95**

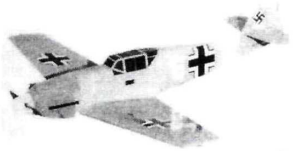


FSP03821
Beechcraft Baron
A beautifully performing, sport-scale R/C suitable for two .10 engines. This easy-to-build George E. Caldwell design is a good starting point for twin-engine flying. WS: 48 in.; L: 29 in.; engine: (2) .10; 4 channels; 1 sheet. **$19.95**

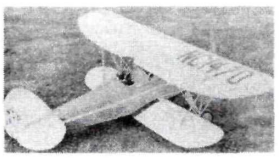


FSP10902
Bellanca P-200 Airbus
Stan Rutz's 1/12 sport-scale float sesquiplane can lift off still water in dead air, and its one-piece construction keeps its interior dry—even if it's overturned! For proficient builders. WS: 65 in.; L: 42.5 in.; engine: .20 to .26 FS; 4 channels; 2 sheets. **$24.95**

FSP12791
Bellanca WB2
This R/C scale model of the transatlantic flier of the late '20s involves fairly complex balsa/ply construction. This design by Eric Fearnley features a lot of detail on an easy-to-fly, high-wing cabin monoplane. WS: 74 in.; L: 41 in.; area: 703 sq. in.; engine: .35 to .40; 4 channels; 1 sheet; LD 4. **$19.95**



FSP05922
1/12-Scale Bf-109 Combat
Designed by Tom Stryker, this plane complies with the AMA 704 WW II Combat event. Simple balsa and plywood construction; no landing gear. It has a fully symmetrical airfoil and wing that are built flat. WS: 34 in.; engine: .15; 1 sheet. **$14.95**



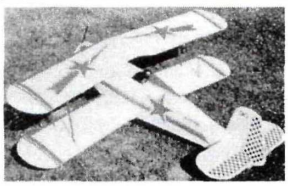
FSP12681
Bird Biplane
Tom Stark's model has an outline and basic structure that follow those of the full-size airplane with only minor airfoil modifications. Construction follows traditional methods. WS: 50 in.; L: 33 in.; area: 598 sq. in.; engine: .23; 4 channels; 1 sheet; LD 3. **$19.95**

FSP06723
Blohm and Voss
WW II's most unusual and controversial reconnaissance plane makes an excellent scale subject by designer Nick Ziroli. It features typical built-up balsa construction with unusually stable flight characteristics. WS: 54 in.; L: 43.5 in.; engine: .40; 4 channels; 1 sheet. **$19.95**

FSP06831
Boeing Stearman PT 13D
A "dime scale" plan for the famous plane that saw such long service in the Army and Navy. This Bengt Norman design features light balsa, built-up construction and a wing with scale rib spacing. WS: 39 in.; L: 31 in.; engine: .19 to .29; 4 channels; 1 sheet. **$14.95**

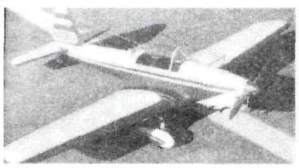
FSP09732
Britten-Norman BN-2A Islander
R/C scale plane designed by Mark Frankel is easily constructed of balsa, ply and foam. Although powered by two engines, this plane performs well with a single engine. It's also good at picking up those flying and scale points. WS: 76 in.; L: 52 in.; engines (2): .40; 5 to 6 channels; 1 sheet; LD 3. **$19.95**

SCALE

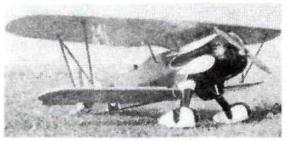


FSP05901
Bucker Jungmeister
Floyd Manly's design of this famous German aerobatic biplane can handle any maneuver. Construction of conventional materials is only moderately difficult. The cabane is easy to make and ensures accurate wing alignment. WS: 53.5 in.; L: 45 in.; area: 967.4 sq. in.; engine: .60 ; 4 channels; 2 sheets; LD 3. **$19.95**

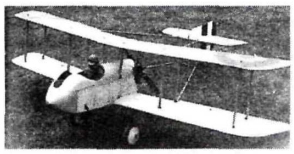
FSP05801
Canadair CL-215
A sport-scale model of the famous twin-engine, amphibian, fire-fighting water-bomber. Steve Gray design uses spruce, balsa and ply as its principal materials. WS: 76 in.; L: 55 in.; area: 791 sq. in.; engine: (2) .25; 5 channels; 1 sheet; LD 4. **$24.95**



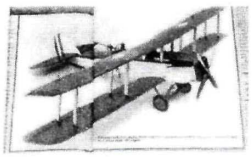
FSP06671
Chipmunk
This scale airplane almost won the World Pattern Championships in the '60s. The Jack Stafford design is true-to-scale and features a built-up fuselage and foam wing. WS: 59 in.; L: 43 in.; engine: .60; 4 channels; 1 sheet. **$14.95**



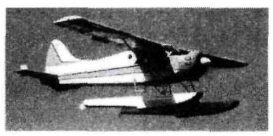
FSP04722
Curtiss Hawk P-6E
This design by Ken Marsh features fairly complex, all built-up construction and has outstanding flight characteristics. WS: 56 in.; L: 40 in.; engine: .60; 4 channels; 2 sheets. **$24.95**



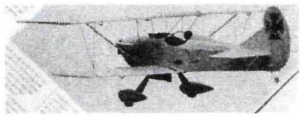
FSP05762
de Havilland D.H. 2
This fabulous scale version of the WW I fighter designed by Peter Neate features extensive, scale-like construction. WS: 56 in.; L: 58 in.; engine: .60; 2 sheets. **$29.95**



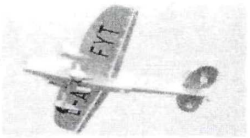
FSP08821
de Havilland DH4
Designed to a scale of 1½ inches to 1 foot, this famous WW I biplane flies well and makes an interesting building project. Designed by Eric Fearnley. WS: 62.5 in.; engine: .40 to .60; 4 channels; 2 sheets. **$29.95**



FSP10891
de Havilland DHC-2 Beaver
This scale rendition designed by Ed Westwood is ideal for intermediate builders. The plans include float construction and installation drawings. Balsa and ply are the primary structural materials, with foam used for the floats. WS: 70.25 in.; L: 46.25 in.; engine: .40 to .50; 4 to 5 channels; 2 sheets. **$19.95**



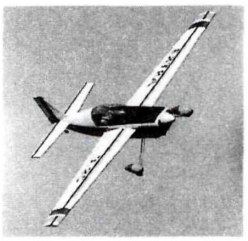
FSP02862
Der Jaeger
Get into the biplane craze with this great-flying scale model designed by Floyd Manly. At 1/5 scale, it's easy to transport, and the construction is straightforward for fast building. This biplane will get a lot of attention at your flying field. WS: 48.5 in.; area: 707 sq. in.; engine: .40 to .60; 4 channels; 2 sheets; LD 3. **$24.95**



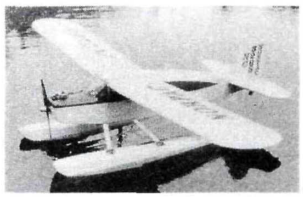
FSP08782
Dornier Do 23G
This 1-inch-to-1-foot scale, twin-engine replica of the WW II German bomber captures all the airplane's lines and details for a very competitive R/C scale project. Beautifully drawn plans by Don Srull feature extensive, interesting construction. WS: 84 in.; L: 61 in.; engines (2): .35; 5 channels; 3 sheets; LD 4. **$29.95**

FSP06921
Dornier 335
Al Masters' scale "Arrow" features a tandem, twin-engine, drive system that avoids the typical one-engine-out problems. Designed from original documentation. WS: 56 in.; engine: (2) .25 2-stroke, or .40 up front and .25 aft; 5 or 6 channels; 2 sheets. **$29.95**

FSP02891
Douglas DC-3
This modeling favorite is presented in ¾-inch-to-1-foot scale and features all-wood conventional construction. Although it isn't very difficult to build, this Dave Ramsey design requires intermediate building and flying skills. WS: 75.25 in.; L: 63 in.; area: 503 sq. in.; engine: (2) .25; 5 channels; 2 sheets; LD 3. **$24.95**



FSP01931
Extra 3.25
Designed by Rich Uravitch, the Extra 3.25 offers the same exciting performance and aerobatics as the full-scale aircraft in a small, "fit-in-your-car" package. It has a traditional balsa-and-ply construction, and a formed-plastic cowl, wheel pants and a canopy are available from the designer. It's relatively easy to build but isn't recommended for beginners. WS: 47.25 in.; L: 36.5 in.; engine: .19 to .28 2-stroke. **$14.95**



FSP04851
Fairchild Ranger
On land or sea, this model will thrill you! John Sullivan's design allows you to build both the float and land versions of this classic light plane in R/C form. Construction follows traditional built-up methods. WS: 56 in.; L: 37.5 in.; area: 520 sq. in.; engine: .15; 3 channels; 2 sheets; LD 2. **$19.95**

FSP02981
Fokker D-VII
Designed by Gary Allen, this ¼-scale Fokker D-VII uses traditional balsa and plywood construction and many standard, off-the-shelf hardware items. Originally powered by a SuperTigre 2500 glow engine, the D-VII would also be ideally powered by a Zenoah G-38 or G-45 gasoline engine. WS: 88 in.; L: 69.5 in.; 4 channels; 4 sheets; LD 3. **$29.95**

Order on the web at: www.rcstore.com

FSP04852
Fokker D-VII
This relatively simple design by Rich Uravitch is built of balsa and ply using traditional methods. WS: 49 in.; L: 41 in.; area: 712 sq. in.; engine: .60 4-stroke; 4 channels; 1 sheet; LD 2. **$19.95**

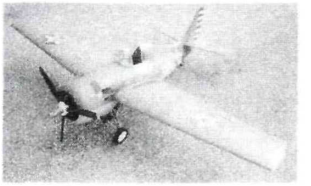
FSP06852
Fokker EV/DVIII
Ernst Udet's WW I aircraft was highly maneuverable for its time. This Walt Musciano scale design is a faithful outline rendition that can be built easily and inexpensively; all balsa. WS: 55 in.; L: 38 in.; engine: .19 to .36; 4 channels; 2 sheets. **$19.95**

FSP03772
Grumman Hellcat
Designed by Eric Fearnley, this fabulous scale model of the WW II Navy fighter flies like a trainer, even though it's scale. Constructed of balsa and ply. WS: 58 in.; L: 41 in.; engine: .60; 4 or 5 channels; 1 sheet. **$19.95**

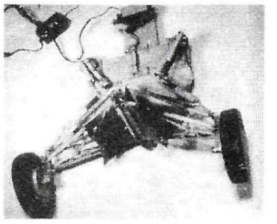
's Stubby Little Fighter

FSP09791
Grumman Wildcat F4F-3
A compact R/C scale model with classic stick-and-tissue construction. The problem of unusual Grumann landing gear is avoided by leaving it off and hand-launching. Designed by J.P. Neate. WS: 38.5 in.; L: 27; area: 270 sq. in.; engine: .15; 3 channels; 1 sheet; LD 3. **$14.95**

FSP01782
Grumman FM-2 Wildcat 1
An excellent R/C scale model of the famous WW II Navy shipboard fighter. This Eric Fearnley design features planked fuselage, sheeted, built-up wings and retractable landing gear. WS: 62 in.; L: 42 in.; engine: .60; 6 channels; 1 sheet. **$19.95**

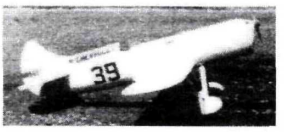


FSP02832
Grumman Wildcat
This Bob Karlsson design should be used with its companion retractable landing gear (FSP03832). Outstanding flight qualities. Uses a complex structure of conventional materials. WS: 76 in.; L: 58 in.; engine: .60 to 1.20; 6 channels; 2 sheets. **$29.95**



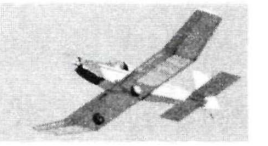
FSP03832
Grumman Wildcat Retractable Gear
Full-size drawing of all the parts you'll need to assemble the retractable landing gear for Bob Karlsson's beautiful airplane (FSP02832). Although the retract is not absolutely necessary, it makes the airborne Wildcat look fantastic. 1 sheet. **$19.95**

FSP04732
Grumman SA-16B Albatross
A gorgeous R/C scale project that operates from land or water. Advanced construction features built-up surfaces and a planked hull. Designed by Chester Babb. WS: 72 in.; L: 46.5 in.; engine: (2) .45; 5 channels; 2 sheets. **$24.95**



FSP04791
Howard Ike
An R/C scale model of Ben Howard's famous racing plane from the "golden age." The fuselage is a basic box "fleshed out" with formers and stringers; the design by Henry Haffke uses balsa, ply and hardwood. WS: 56 in.; L: 45 in.; engine: .40; 4 channels; 2 sheets. **$19.95**

FSP07712
Howard Pete
This scale Thompson Trophy racer was designed by Alex Chisolm. The airframe has built-up, sheeted fuselage and wings. WS: 59.25 in.; L: 47 in.; engine: .40; 4 channels; 1 sheet. **$14.95**



FSP04971
Jodel Bebe
Designed by Randy Randolph, the Jodel Bebe is a simple-to-build, sport-scale model of a popular homebuilt design. The wing design incorporates a high degree of wingtip dihedral and gives great stability, so it's perfect for the low-time pilot. Designed for throttled .05 glow engines, the Jodel is sized perfectly for schoolyard flying. WS: 39 in; W: 21 oz.; engine: .03 diesel, 049-.09 glow; 3 channels (throttle, rudder and elevator); LD 1. **$14.95**

FSP08753
Little Toot
A magnificent scale biplane of the famous aerobatic machine. Flight capability is outstanding with smooth, precise maneuvers. Design by Dennis Tapsfield involves extensive construction of conventional materials. WS: 57 in.; L: 49.5 in.; engine: .61 to .90 2-stroke or .91 to 1.20 4-stroke; 2 sheets. **$24.95**

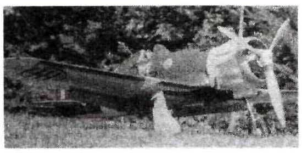
FSP01951
LTV A-7 Corsair II
Rich Uravitch's 4-channel, A-7 Corsair is an aerobatic, .25-powered semi-scale "jet" without the complexity of a ducted fan. This highly aerobatic eye-catcher really stands out on the flightline and in the air. It can be built by anyone, but to fly it, you'll need at least intermediate flying skills. WS: 35.5 in.; L: 36.75 in.; engine: .19 to .28ci; 3 sheets. **$19.95**

FSP12961
Macchi MC.200 Saetta
The Macchi MC.200 Saetta is a precision-scale balsa and plywood model of the WW II Italian fighter. All scale-fittings, cockpit interior and control surfaces are shown, as is a dummy, twin-row radial engine. The wing is the same as the full-size Macchi MC.200 Saetta, and the left panel is slightly longer than the right. Washout is built into the wing, and building tabs are drawn on each rib. WS: 79.9 in.; L: 60.5 in.; weight: 13.3 lb; scale: 1:5.2; engine: 1.08 2-stroke; radio: 6 channels; 9 sheets; LD 4. **$49.95**

LEVEL OF DIFFICULTY Every plans set includes construction notes, and many include a difficulty rating to help you assess the challenge that faces you!

LD 1 = beginner
LD 2 = beginner to intermediate
LD 3 = intermediate to advanced
LD 4 = advanced

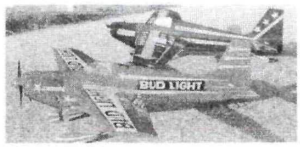
SCALE



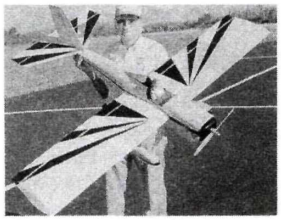
FSP12962
Macchi MC.200 Saetta Full-Size Scale Drawings
A set of full-size, scale-detail views (drawn in 1:5.2 scale) to enhance your Macchi MC.200 Saetta, shows the top, left, right, front and bottom aircraft-exterior views. Details include rivet, screw and panel-line details, wheel-well interior structures, complete cockpit interior, control stick and rudder pedals, instrument panel and aircraft insignia outline and positions. (There are no model structures shown.) 5 sheets. **$29.95**

FSP11761
Messerschmitt ME-163B-1A
This exciting model of the first WW II rocket-powered plane is a true masterpiece. Colin Moss's tailless design features leading-edge slots and great maneuverability. Constructed of balsa and ply. WS: 59 in.; L: 38 in.; 5 channels; 2 sheets. **$19.95**

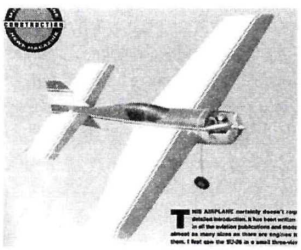
FSP10824
Mew Gull Wing Development
Throw away the foam wing on your Percival Mew Gull (FSP10821), and replace it with this superior built-up wing. A Hal deBolt design—naturally. 1 sheet. **$19.95**



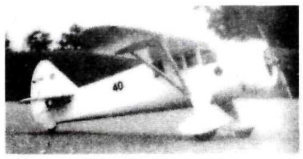
FSP04882
Micro Laser 200
This double-dynamite, mini-sport scaler gives spritely performance on a small building budget. Not recommended for beginners, but the experienced flier will have a ball. This Bob Cook design has an interesting building format. WS: 24 in.; L: 17 in.; area: 90 sq. in.; engine: .02 to .03; 2 channels; 1 sheet; LD 3. **$14.95**



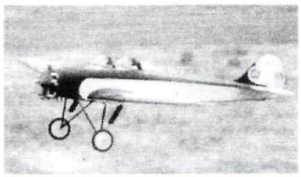
FSP11961
miniMax 1200Z
The miniMax is a semi-scale, IMAA-legal model of an ultralight aircraft that's easy to build and fly. It has plug-in wing panels that use an aluminum tube and a fiber sleeve for wing attachment. The construction is traditional balsa and plywood. WS: 80 in.; L: 56 in.; engine: .60 2-stroke, .90 4-stroke; 2 sheets; LD 2. **$19.95**



FSP01941
Mini Sukhoi Su-26
This is a great little sport-scale model of the famous Russian unlimited world aerobatic championship aircraft. Designed by the famous Nick Ziroli Sr., the Mini Sukhoi can be powered by a Cox .049 or a .10 engine. With typical balsa-and-ply construction throughout, the model is built in one piece without a removable wing. Designed to be flown on *four channels, it can easily be flown* with only two channels (ailerons and elevator). WS: 33.5 in.; L: 24 in.; engine: ½A to .10; 2 to 4 channels; 1 sheet. **$14.95**

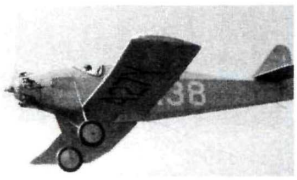


FSP04702
Mister Mulligan
A scale R/C model of one of the most famous airplanes of the '20s and '30s, this Hurst Bowers design is extremely attractive, flight-capable and fun to build. Construction is built-up stringer-style with balsa and ply. WS: 42.5 in.; L: 31 in.; engine: .15; 4 channels; 1 sheet. **$14.95**



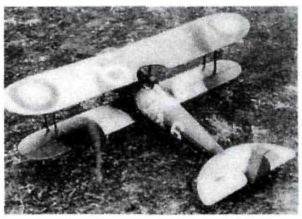
FSP06971
Mohawk Pinto
The Mohawk Pinto is an unusual 1920s, twin-cockpit, British lightplane, and it makes an excellent scale project. Designed by Phillip S. Kent, this IMAA-legal model uses traditional balsa-and-plywood construction techniques. The tail feathers are built *using the core method. The finished* model is strong and lightweight and very easy to fly—a good first-time competition scale project. WS: 86 in.; L: 58 in.; engine: .65 – .90 4-stroke.; 3 sheets; LD 3. **$24.95**

FSP06811
Monoprep
A beautiful parasol from the '20s, this aircraft is easy to build and flies like an old-time free-flighter. It's an ideal R/C scale project for modelers who have some building experience. The design by Doc Mathews is built up of balsa and ply. WS: 72 in.; L: 48.85 in.; area: 820 sq. in.; engine: .30 to .40; 4 channels; 1 sheet; LD 2. **$19.95**



FSP06981
Nicholas Beazley NB4
This is a traditionally built, all-wood monoplane. The wing has a flat center section, and the outer panels provide the dihedral. WS: 76 in.; L: 53 in.; 4 channels; engine: .46 to .60 2-stroke, .56 to .75 4-stroke; 2 sheets; LD 3. **$19.95**

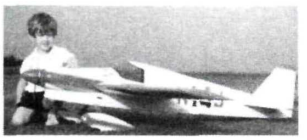
FSP07631
Nieuport 27
This design by Joe Leitner has scale outlines and scale-type construction in traditional wooden materials, which are fabric-covered. It takes a fair amount of experience to construct. WS: 60 in.; L: 35 in.; engine: .35; 3 channels; 1 sheet. **$19.95**



FSP03801
Nieuport 28
An R/C standoff-scale model of one of the best-looking biplanes of WW I. The design by Nick Ziroli features balsa/ply built-up construction. WS: 51 in.; L: 40 in.; engine: .40 to .60; *4 channels; 1 sheet.* **$19.95**

FSP09681
North American OV-10A

This twin-engine project is without the usual twin-engine problems. The airplane has superb flight characteristics. The design by Frank Capan utilizes sheet balsa, heavy square stock and plywood. WS: 68 in.; L: 48 in.; engine: (2) .60; 4 to 6 channels; 2 sheets. **$24.95**



FSP09832
Ole Tiger

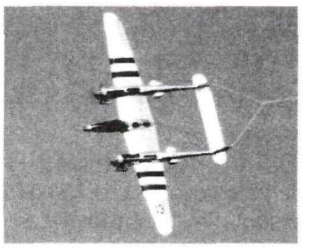
An ideal subject for pattern or scale, this Dan Santich design is a Formula 1 aircraft in R/C model scale form. Ideal for .60 engines in straight or geared configurations, this plane will take advantage of expert piloting skills while remaining accessible to Sunday fliers. Built-up balsa and hardwood. WS: 72.5 in.; L: 64.5 in.; area: 1,100 sq. in.; engine: .60 to 1.20; 4 channels; 2 sheets; LD 3. **$29.95**

FSP04981
One Design .40

Designed by Rich Uravitch, this conventionally built, all-wood design would make a great entry for Minimac and/or sport-scale competition. WS: 47.2 in.; L: 44 in.; power: .40 2-stroke, .70 4-stroke; 2 sheets; LD 2. **$14.95**

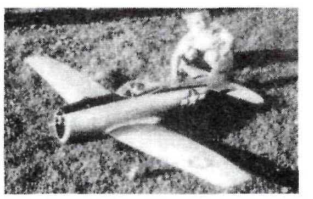
FSP11951
OV-10 Bronco

The North American Rockwell OV-10 Bronco is a simple, scale, small-displacement model that makes a perfect first twin-engine project. It's easy to construct, especially if you use the formed-plastic parts available from its designer Rich Uravitch. WS: 52 in.; L: 52 in.; power: (2) .20 to .25 engines or .05 to .15 motors; 4 channels. **$19.95**



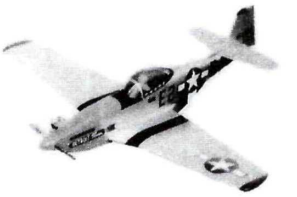
FSP09971
Combat P-38 Lightning

This 1/12-scale Combat P-38 Lightning is an all-balsa and plywood twin with simplified construction. It has good engine-out performance and is a fast and smooth flyer. WS: 49.5 in.; engines: two .10 to .15 2-strokes; 3 channels; 2 sheets; LD 3. **$14.95**



FSP10652
P-47N Thunderbolt

Although this R.L. Shellenbaum design is time-worn, the techniques used in its construction are the same as those of today, making a very maneuverable airplane out of conventional materials. WS: 63 in.; L: 49.5 in.; engine: .60; 4 or 5 channels; 2 sheets. **$19.95**



FSP05921
1/12-Scale P-51 Combat

Designed by Tom Stryker, this 1/12-scale WW II dogfighter is designed to comply with the AMA 704 WW II Combat event. Simple balsa and plywood construction; no landing gear. The model has a fully symmetrical airfoil and wing that are built flat on the workbench. WS: 37.25 in.; engine: .15; 1 sheet. **$14.95**

FSP07852
P-51B Mustang

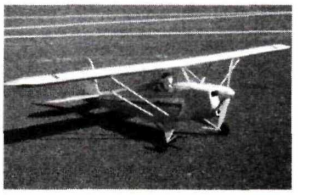
A great semi-scale model for pattern designed by Bengt Norman. Not true to scale, the airplane uses typical pattern moments and force arrangements while retaining the Mustang look. WS: 54 in.; L: 86.5 in.; area: 580 sq. in.; engine: .40 to .50; 5 channels; 2 sheets; LD 3. **$19.95**

FSP10821
Percival Mew Gull

Designed by Bruce Lund and George Schmid, this graceful, 1/4-scale pylon racer flies like a stable pattern ship and is easy to build. WS: 68 in.; L: 60 in.; engine: .60; 4 channels; 2 sheets. **$19.95**

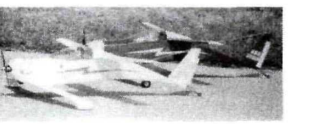
FSP04742
Pitts S1A

This Jerry Nelson design is a top flight machine for IMAC events. The beautiful plans set for this champion full-scale aerobatic plane features construction that's somewhat advanced, but not beyond the capabilities of most sport modelers. WS: 48 in.; L: 41 in.; engine: .60; 4 channels; 1 sheet. **$19.95**



FSP10981
The Pober Pixie

The Pober Pixie is a great flying, sport-scale parasol design of all-wood construction. The wing, cabane struts and removable cockpit area are all permanently attached to one another, and this arrangement gives both good appearance and unrestricted access to the inside of the fuselage. WS: 62 in.; L: 46.75 in.; engine: O.S. .52; 4 channels; 1 sheet; LD 2. **$14.95**



FSP01821
1/4-Scale Quickie

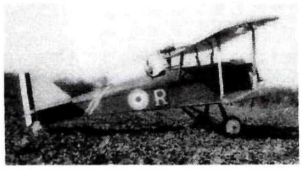
Quarter-scale version of the famous Bert Rutan Quickie, featuring balsa/ply/foam construction in an easily built format. A truly unusual canard design by K. Sterner. WS: 48 in.; L: 50 in.; engine: .40; 4 channels; 1 sheet. **$19.95**

Order on the web at: www.rcstore.com

LEVEL OF DIFFICULTY Every plans set includes construction notes, and many include a difficulty rating to help you assess the challenge that faces you!

LD 1 = beginner
LD 2 = beginner to intermediate
LD 3 = intermediate to advanced
LD 4 = advanced

SCALE



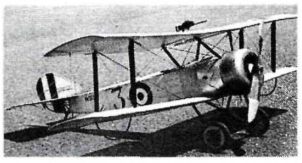
FSP03852
R.A.F. SE 5A
A member of the WW I "Dawn Patrol," Rich Uravitch's aircraft will let you enjoy the fun of a biplane without the pain of intricate building. This design, for intermediate builders, is built up of balsa and ply in a relatively easy format. WS: 50 in.; L: 40 in.; area: 800 sq. in.; engine: .60 4-stroke; 4 channels; 1 sheet; LD 2. **$19.95**

FSP07811
Reggiane RE-2005 Sagittario
A representation of Italy's best WW II fighter in 1 ¾-inch scale by Donald Grassi. It's a challenging building project in balsa, plywood and hardwood. The airplane flies in a scale-like manner—a sure winner. WS: 63 in.; L: 50 in.; area: 682 sq. in.; 4 to 6 channels; 2 sheets; LD 4. **$39.95**

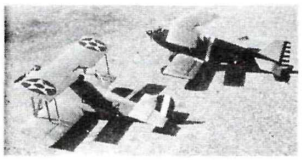
FSP06843
Republic P-47 Thunderbolt
This "penny-pinching warbird" will be a neat addition to your sport-scale hangar. The built-up Rich Uravitch design is easy to build and easy to fly. WS: 40 in.; L: 29 in.; engine: .15 to .19; 4 channels; 1 sheet. **$19.95**

FSP12891
Squint Scale P-40 Tomahawk
This Tim Farrell design might be just the R/C model you've been looking for. It looks like a full-size airplane; it's simple to build and very easy to fly. Built-up construction with conventional materials. WS: 62 in.; L: 57 in.; area: 785 sq. in.; engine: .60 4S; 4 channels; 2 sheets; LD 3. **$29.95**

FSP11822
Sky Ranger
This "silhouette-scale" design by D.B. Matthews has an easy-to-handle conventional building format; constructed of balsa, ply and hardwood. WS: 50 in.; L: 32 in.; engine: .15; 3 channels; 1 sheet. **$14.95**

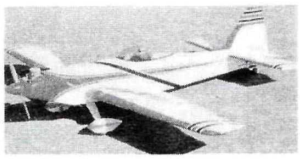


FSP04773
Sopwith Scout (PUP)
Designed by Bud Roane, these fabulous scale plans for the famous WW I fighter feature scale-based construction with conventional materials. Plane has outstanding flight characteristics. WS: 49 in.; L: 39 in.; engine: .45 to .60; 4 channels; 2 sheets. **$24.95**

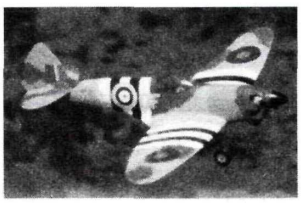


FSP02691
Sperry Messenger
This 1920 U.S. Army scout airplane was often called the "cutest airplane in the Army." The Bert Streigler design retains all the charm of the full-size plane. It's an outstanding flier and easy to build. WS: 48 in.; L: 36 in.; engine: .49; 4 channels; 2 sheets. **$14.95**

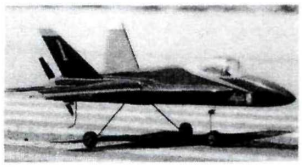
FSP08831
Spezio Tuholer
Designed by Cliff Tacie, this was one of the USA's entries in the Reno Scale World Championships. Suitable for sport scale and all-out FAI competition, it's an exact replica of the full-size, home-built airplane; built of conventional materials. WS: 74 in.; area: 1100 sq. in.; engine: .60 to .90; 4 channels; 2 sheets; LD 3. **$29.95**



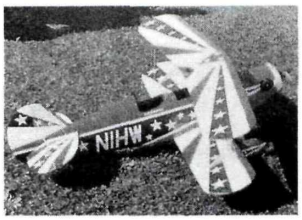
FSP03781
Spinks Akromaster
Originally designed for the TOC 1978 Prototype Aerobatic program in Las Vegas, this Ed Keck design remains a nifty sport/scale/pattern airplane. The airplane is large but easy to build of conventional materials. WS: 74 in.; L: 63 in.; engine: .90 to 1.20; 4 channels; 2 sheets. **$24.95**



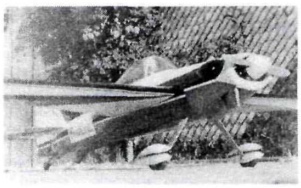
FSP02951
Spitfire Mk VIII
Designed by Roy Day, this 60-size sport-scale model has the classic outline of the WW II fighter with the simplicity of fixed gear. The model has elliptical, foam-core wings, foamboard fuselage formers and a bolt-on tail assembly. With a wing loading of only 21 oz./sq. ft., the 6½-pound Spitfire is stable and easy to fly, and it has generous wing fillets—a Spitfire trademark. Original model features D-day invasion markings. WS: 64 in.; engine: .60 2-stroke, .65 to .70 4-stroke; 2 sheets. **$19.95**



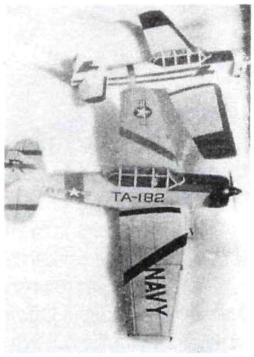
FSP04891
Sport F-18 Hornet
This sport flier has its engine mounted at the aft of the fuselage, and it uses a pusher prop rather than a ducted fan for propulsion. Designed by Richard James, the model is easy to build using conventional materials such as balsa and ply. It's recommended for intermediate R/C fliers. WS: 32 in.; L: 36 in.; engine: .25; 3 channels; 1 sheet. **$19.95**



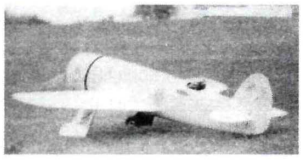
FSP06773
Steen Skybolt
One of the best biplanes *Model Airplane News* has ever presented, this design by Bob Noll isn't too difficult to build and has outstanding flight qualities. Typical balsa construction. WS: 52 in.; L: 42 in.; engine: .60; 4 channels; 1 sheet. **$19.95**



FSP12752
Stephens Akro
This all-balsa, all built-up R/C sport-scale model of the famous home-built designed by Frank Capan is very good-looking and very maneuverable. WS: 64 in.; L: 50 in.; engine: .61; 4 channels; 1 sheet. **$19.95**



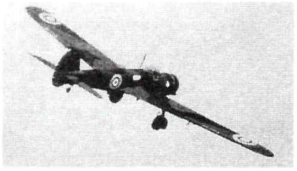
FSP04821
T-6 Texan
An easily constructed performance-packed, "penny-pinching" sport racer. The all-balsa, built-up design by Rich Uravitch uses foam for its turtle deck. WS: 44 in.; L: 31 in.; engine: .15 to .19; 4 channels; 1 sheet. **$14.95**



FSP08851
Time Flies
This Henry Haffke design is a golden-age classic with superb flight characteristics. It features planked, sheeted fuselage and wings. WS: 72 in.; L: 51 in.; area: 900 sq. in.; engine: .90 to 1.20; 4 to 6 channels; 2 sheets; LD 3. **$29.95**

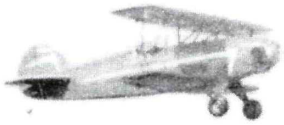
FSP11652
Travel Air 2000
This is one of Bill Northrup's finest designs. The built-up construction of conventional materials requires advanced modeling skills. Flight characteristics are outstanding. WS: 70 in.; L: 45 in.; engine: 65+; 4 channels; 2 sheets; LD 4. **$19.95**

FSP12901
Ultimate Bipe
An incredible aerobatic performer that gave rise to a full-scale plane of the same name, Floyd Manly's Ultimate Bipe is easy to fly yet capable of doing all that you ask of it. It's favored by many top aerobatics competitors. The plan is suitable for "high-level" intermediate builders. WS: 51 in.; L: 49.5 in.; power: .45 to .74ci; 4 channels; 2 sheets. **$24.95**



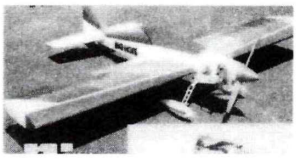
FSP12822
Vickers Wellesley
This is a scale model of one of the largest, single-engine, twin-cockpit bombers ever built. The Walter Musciano design has very light wing loading. WS: 37.5 in.; L: 20 in.; engine: .051; 3 channels; 1 sheet. **$14.95**

FSP03851
Vultee L1 Vigilante
Build this WW II classic and you will have your own contest-winning STOL. This R/C 1/8-scale project was designed by Eric Fearnley and is best suited to advanced builders. WS: 76.5 in.; L: 51 in.; engine: .60 4-stroke; 5 channels; 2 sheets. **$29.95**

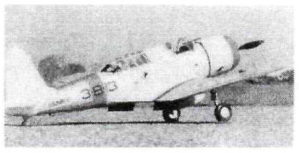


FSP06761
Waco ATO Taperwing
Designed by Willard Chapman, the built-up airframe is very sturdy. WS: 48 in.; L: 41.5 in.; 1 sheet. **$19.95**

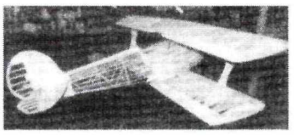
GIANT SCALE



FSP11861
Big Hots
One of the best flying giant models of all time, this Dan Santich design observes the great tradition of the original Hots family. Simple construction methods on two huge full-size drawings make a quick-to-build model that flies well. WS: 91 in.; L: 78 in.; area: 1800 sq. in.; engine: 1.5; 4 channels; 3 sheets; LD 2. **$29.95**

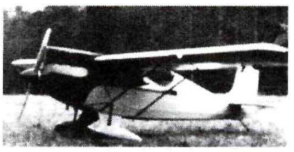


FSP09881
Chance Vought SB2U-1 Vindicator
This pre-WW II Navy classic is a large 1/6-scale model not recommended for beginners because of its size and complexity. However, this Doc Keith design uses conventional materials and construction techniques, so a modeler with reasonable skills and experience should have little difficulty. WS: 84 in.; L: 84 in.; area: 1220 sq. in.; engine: 2ci or larger; 7 channels; 3 sheets; LD 4. **$29.95**

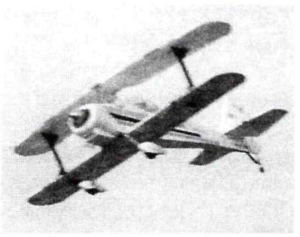


FSP05891
Classic Sport Bipe
This lightly loaded, Great Lakes look-alike is an ideal aerobatic airplane that's extremely impressive when equipped with smoke. Designed by Gerald Garing. WS: 72 in.; L: 65 in.; area: 1640 sq. in.; engine: 1.8; 4 channels; 3 sheets; LD 3. **$29.95**

FSP03841
Cobra
Unprecedented giant-scale model of a famous racer. Twin gull wings on a Midget Mustang fuselage make this Dan Santich design a real flying machine. Built-up balsa/ply/hardwood construction. WS: 76 in.; L: 65 in.; engine: 2+; 4 channels; 3 sheets. **$34.95**

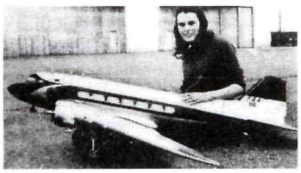


FSP06832
Corben Super Ace
This 1/3-scale airplane is suitable for chain-saw engines and has easy flight characteristics and rugged construction for long life. It's a nearly ideal first giant-scale project designed by Dan Santich. WS: 110 in.; L: 70 in.; engine: 1.8+; 4 channels; 3 sheets; LD 3. **$34.95**

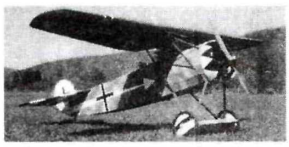


FSP02941
CR-270 Sport Biplane
This giant-scale biplane designed by Chuck Rhodes was made for use with the SuperTigre 2500 engine. Both wings are built flat over the plans with the help of shims to keep the ribs aligned properly. Conventional balsa-and-plywood construction is used throughout (no foam). A fiberglass cowl, a clear canopy and wheel pants are available from Fiberglass Specialties, and the designer can supply aluminum landing gear. WS: 66.5 in.; L: 56.5 in.; area: 1300 sq. in.; engine: 1.2 to 1.8 2-stroke; 2 sheets; LD 2. **$24.95**

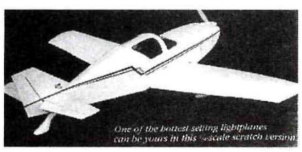
GIANT SCALE



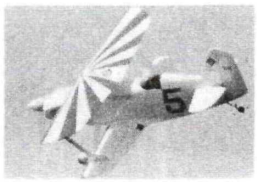
FSP06711
Douglas DC-3
One of the finest scale projects for R/C ever published in *Model Airplane News*, this Paris White design features fully planked and sheeted fuselage and flight surfaces. In flight, the plane is stable enough to match the skills of infrequent fliers; it has no bad habits. WS: 94 in.; L: 49 in.; engine: (2) .50 to .60; 6 channels; 2 sheets. **$29.95**



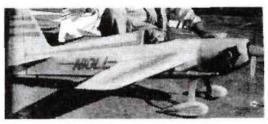
GSP00001
Fokker D-VIII
This huge, 3/10-scale treatment of Germany's famous WW I parasol fighter ties an enjoyable building experience with an ideal beginners' giant-scale airplane. Extensive scale-like construction using conventional materials. Bob Dunn was the project director on this Southern Tier Aero Radio Society (STARS) design. WS: 98 in.; L: 66 in.; engine: 2.4; 4 channels; 3 sheets; LD 1. **$29.95**



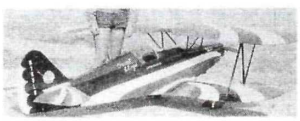
FSP03861
Glasair
This is a fine scale model that flies well and looks good. This Ron Sebosky-designed aircraft is between ¼ and ⅓ scale, but it's not at all ungainly. Construction is of balsa, plywood and hardwood. WS: 71 in.; L: 57 in.; area: 781 sq. in.; engine: .90 to 1.20; 4 channels; 3 sheets; LD 3. **$29.95**



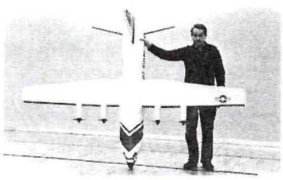
FSP10851
Knight Twister Imperial
A peerless, exciting-to-fly golden-age classic in ⅓ scale, this Dan Santich design requires extensive building; the full-size parts are drawn on a separate sheet. WS: 70 in.; L: 62 in.; area: 1505 sq. in.; engine: 2ci or larger; 4 channels; 3 sheets; LD 3. **$34.95**



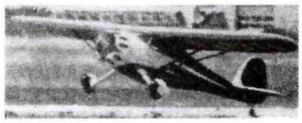
FSP07791
Laser 200
A big scale model of Leo Loudenslager's Laser 200 designed for pattern aerobatics or standoff scale using a geared .90 for power. This design by Wayne Ulery involves extensive construction with balsa, hardwood, ply and foam wings. WS: 85.5 in.; L: 63.25 in.; engine: .60 to 1.20; 4 channels; 2 sheets. **$29.95**



FSP07861
Liberty Sport B
This advanced Roger Stern design spans nearly 8 feet and requires a gas engine. This model features built-up rib sections, detachable wing panels and laminated wingtips. WS: 79 in.; area: 2041 sq. in.; 4 channels; 4 sheets; LD 4. **$34.95**

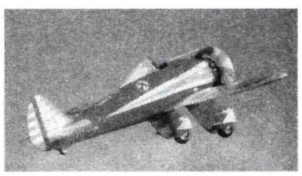


FSP12811
Lockheed C-130 Hercules
Skip Mast's giant-scaler is based on the huge Lockheed Hercules. A college-level course in foam-building techniques. Foam sections are covered with sheet balsa. WS: 102 in.; L: 75 in.; area: 1020 sq. in.; engine: (4) .19 to .25; 6 to 8 channels; 1 sheet; LD 4. **$29.95**



FSP02811
Monocoupe 90A
A ¼-scale replica of a classic '30s light plane. All of that airplane's magnificent lines are duplicated in this fine R/C scaler designed by Don Palumbo and Tony Lombardo. Construction features a stringered fuselage and built-up wing; materials used are balsa, hardwood and ply. WS: 95 in.; L: 58 in.; area: 1309 sq. in.; engine: .60 to 1.20; 2 sheets; LD 3. **$29.95**

FSP10932
Nifty 80
Designed by Gerry Yarrish, this is an easy-to-build, giant-scale budget trainer. WS: 80 in.; engine: G-23; 2 sheets. **$19.95**

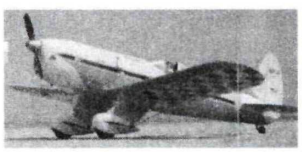


FSP09822
P-26A Peashooter
A unique scale model that has not yet been overdone. This great ¼-scale subject, when finished in its colorful paint scheme, is a sure winner. Plenty of balsa/ply construction in this design by Dan Santich. WS: 84 in.; L: 71 in.; engine: 2 to 2.5; 4 channels; 2 sheets. **$34.95**

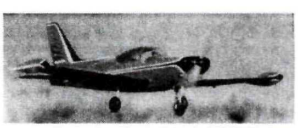
FSP09951
Giant Peashooter
Designed by world-renowned modeler Henry Haffke, this IMAA-legal model is an all-wood, built-up sport plane with a scale-like appearance. The super-easy-to-build design has extremely docile flight characteristics. WS: 82 in.; L: 64 in.; area: 1250.5 sq. in.; engine: .90 2-stroke or 1.20 4-stroke; 2 sheets; LD 2. **$19.95**

FSP04961
P-51 Mustang
This Dan Santich design is an excellent balsa and plywood model both for unlimited racing and giant-scale warbird rallies. It includes flaps and retracts, and it's finished off with Nick Ziroli's canopy and cowl. WS: 101 in.; L: 86.5 in.; engine: 2 to 7.4ci; 4 sheets. **$24.95**

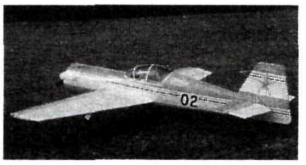
GSP00005
Piper J-3 Cub
A true-to-scale version in both outline and construction of Bob Nelitz's famous original. Scaled at 4 inches to 1 foot, a huge 12-foot wing makes this an extremely impressive model. WS: 144 in.; L: 81 in.; engine: 2.4; 4 channels; 2 sheets. **$34.95**



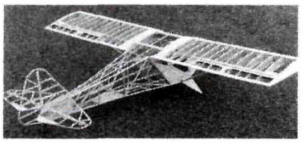
FSP05861
Ryan STA
This classic design combines the aesthetic qualities of "golden age" aircraft with modern-day aerobatic performance. Burnis Fields' 1986 ¼-scale plans are beautifully drawn and include building illustrations. WS: 91 in.; L: 67.5 in.; area: 1296.75 sq. in.; engine: 1.5; 5 channels; 3 sheets; LD 4. **$34.95**



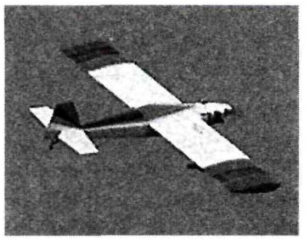
FSP06931
SIAI Marchetti SF-260
This "modern-day fighter trainer" is faithfully reproduced in ¼ scale. Designed by David W. Goerne, this model is maneuverable and fast. The plans include three large sheets and cutaway and instrument-panel illustrations by master aviation artist Jim Newman. WS: 87 in.; L: 70.5 in.; engine: 2.6 to 3.4ci. **$29.95**



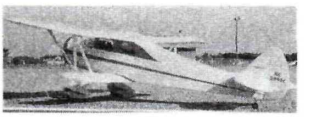
FSP07961
Sukhoi Su-29
This Mark Sirianni design is a ¼-scale version of the Su-29 and is built up of balsa and plywood. As well as the wood and standard hardware parts, you'll need an Ace R/C canopy to complete this IMAA-legal beauty. WS: 80 in.; L: 54.75 in.; area: 1036 sq. in.; engine: .90 2-stroke or 1.20 4-stroke; 2 sheets; LD 2. **$19.95**



FSP06951
Swick Taylorcraft
Designed by master modeler Jim Simpson, this beautiful, ¼-scale, balsa-and-ply craft is modeled after the famous Taylorcrafts rebuilt by Mike Swick (but control surfaces have been modified, wings shortened, angles altered, ailerons counterbalanced). If you have the thumbs, this model can really put on a show. WS: 82.5 in.; L: 68 in.; 1.08 to 1.80 2-stroke, or 1.20 to 1.60 4-stroke; 4 channels; 3 sheets. **$24.95**



FSP11901
Ultra Hots
The super-aerobatic Ultra Hots is stable in slow flight but, in designer Dan Santich's words, it's "the most capable model I have ever owned." It's for intermediate builders, but it will bring out the best in any aerobatic flier. WS: 81 in.; L: 64.5 in.; engine: 1.5 to 4ci; 4 channels; 2 sheets. **$24.95**

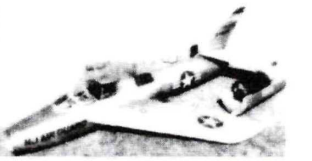


FSP06891
Waco "E"
This replica duplicates all the style and grace of the original classic design. Its "cabin" configuration retains the flavor of a biplane without the use of cabane struts. Designed by Douglas Hobbs, it has a built-up structure of conventional materials. WS: 72 in.; L: 56 in.; area: 1147 sq. in.; engine: .90 4-stroke; 4 channels; 2 sheets; LD 3. **$29.95**

GSP00004
Witman Tailwind
Practical aerodynamics, simplified construction and good flight performance are the signatures of Steve Witman's excellent home-built. These virtues carry over into Hal deBolt's model presentation, making it an ideal first giant-scale project. Fully built up of conventional materials. WS: 82 in.; L: 72.5 in.; engine: 1.8+; 4 channels; 4 sheets; LD 3. **$24.95**

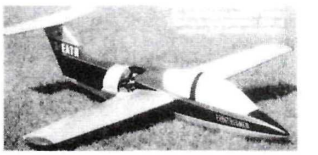
DUCTED FANS

FSP04931
Douglas F4D-1 Skyray
This precision, 1/7-scale model by Mark Frankel can be flown off grassy fields. Mixing radio with at least 7 channels is required. WS: 57.5 in.; L: 77.5 in.; engine: O.S. .91; fan unit: Dynamax. **$29.95**

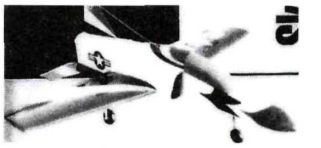


FSP01853
F-84F Thunderstreak
An Air Force jet fighter of the '50s, the Thunderstreak formed the basis for this Walt Musciano-designed ducted fan. Built of balsa and lite-ply, this small R/C airframe is fully sheeted and planked. It uses a Midwest RK-049 fan unit and is hand-launched. WS: 33.5 in.; L: 39 in.; area: 235 sq. in.; engine: .049; 2 to 4 channels; 2 sheets; LD 3. **$14.95**

FSP12931
F4D-1 Skyray
Made of balsa and plywood, Eugene Martin's Navy jet fighter is for experienced modelers. It has an open-bay construction with capstripped ribs in the fin and wing panels. The fuselage is planked with balsa sheeting and has a removable main hatch. The plans show details for making a fixed wing and a removable wing. Retracts are shown on the plans. WS: 50.14 in.; L: 67.34 in.; engine: OPS .80 with Byron fan unit; 3 sheets. **$29.95**

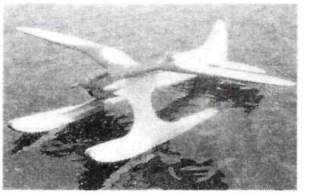


FSP01901
Fantrainer
Here's a sport-scale model that delivers performance with a Cox TD engine. Paul Willenborg's design uses available materials and basic modeling techniques. It's best for intermediate fliers who want to experience the fun of ducted-fan flight. WS: 36.5 in.; L: 34.25 in.; area: 195 sq. in.; engine: TD .049; 3 channels; 1 sheet; LD 3. **$14.95**



FSP02921
Skyburner .60
This 9.5-pound, entry-level ducted fan can be built with available materials for less than $100 (not including engine, fan and radio, and with a fixed landing gear). The Skyburner has sheeted-foam wings. Depending on how you configure it, you can have a docile ducted-fan sport plane or a screamer. The plane can be flown off almost any grass field. WS: 56 in.; L: 54 in.; power: any .60 to .90 rear-intake, rear-exhaust engine with a Dynamax fan; 4 channels; 2 sheets. **$24.95**

OLD TIMERS



FSP10892
'89 Swoose
A graceful old-timer F/F converted and enlarged for R/C float operation. Designed by Nick Ziroli, it features a gull wing and an elliptical planform built up out of balsa and plywood. WS: 62 in.; L: 47 in.; area: 588 sq. in.; engine: .40 to .50; 4 channels; 2 sheets; LD 2. $**24.95**

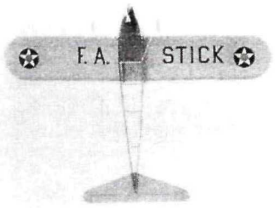
FSP05683
Apprentice
This may be the best R/C trainer ever designed; forgiving, yet maneuverable. Straightforward construction in a Bill Northrop design. WS: 72 in.; L: 52.25 in.; engine: .19 to .40; 4 channels; 1 sheet; LD 2. **$14.95**

LEVEL OF DIFFICULTY Every plans set includes construction notes, and many include a difficulty rating to help you assess the challenge that faces you! **LD 1 = beginner** **LD 2 = beginner to intermediate** **LD 3 = intermediate to advanced** **LD 4 = advanced**

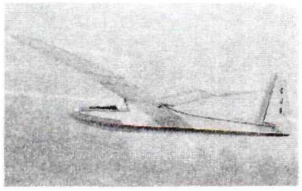
OLD TIMERS

FSP11772
Brigadier
Another Doc Mathews old-timer design for R/C-assist. This airplane faithfully follows the original design with spruce spars and all-balsa construction. WS: 56 in.; L: 36.5 in.; engine: .09 to .15; 3 channels; 1 sheet. **$19.95**

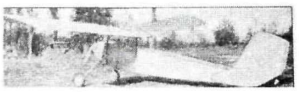
FSP03811
Dot 1
This Vince Micchia design is really a trainer, but it is built in the style of old-time free-flighters. This R/C beauty will teach you all the building and flying tricks of the trade. Features a beautiful built-up structure of balsa sticks and sheet. WS: 73 in.; L: 51 in.; area: 738 sq. in.; engine: .19; 3 channels; 1 sheet; LD 3. **$19.95**



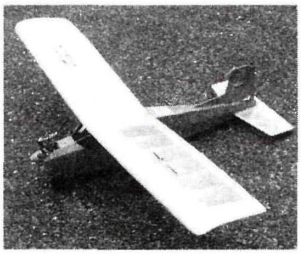
FSP02901
Flying Aces Stick
Bill Effinger and Tracey Petrides created this airplane as a free-flighter in 1936; Randy Wrisley recreated it as an OT R/C-assist in 1990. It features a stick-type crutch fuselage and built-up surfaces. WS: 60 in.; L: 42.5 in.; area: 573.5 sq. in.; motor: .05 ; 3 channels; 1 sheet; LD 2. **$14.95**



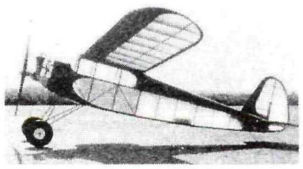
FSP01861
Gamma Gull
This OT sailplane can be built with gull or straight wings. The design by Gordon Rae features built-up construction of balsa and plywood. WS: 70 in.; L: 37.5 in.; area: 435 sq. in.; 2 channels; 1 sheet; LD 2. **$19.95**



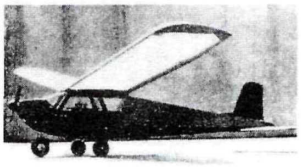
FSP04351
The KG
One of the first, inherently stable, gas-powered model airplanes, the historic KG was key in the development of gas-powered aeromodeling. In the 1934 Nats, the 8-foot-span original took second with a flight of 14 minutes, 2 seconds, and in 1935, the 10-foot-span KG-2 made a record flight of 64 minutes, 40 seconds. See *Model Airplane News* reprints from April, May and June, 1935, for complete assembly instructions. For advanced builders. WS: 8 or 10 ft.; L: 59 in.; power: 4-stroke .90 recommended for R/C-assist; 4 channels; 2 full-size sheets; LD 3. **$29.95**



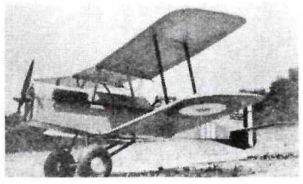
FSP12951
Live Wire II
This great-flying, updated, simplified version of Hal deBolt's classic was designed by George Wilson. It is easy and inexpensive to build and operate. WS: 47.5 in.; area: 420 sq. in.; engine: .10; 1 sheet; LD 1. **$14.95**



FSP04812
Old-Timer Satyr
This free-flight, 3-channel R/C-assist is a 1943 design, which makes it eligible for old-timer events. This balsa plane from Czechoslovakia, revamped by Jaromir Pipek, follows the building practices of the '40s. WS: 65 in.; L: 46 in.; area: 648 sq. in.; engine: .25 glow, .40 ignition; 3 channels; 1 sheet; LD 2. **$19.95**

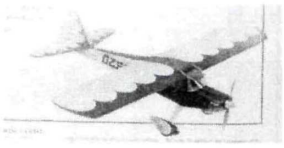


FSP11791
Rudder Bug
This R/C airplane was designed by Walt Good for rudder-only operation. First published in May 1949, the original was powered by a Delong .30 engine; crutch-based fuselage construction with a built-up open-structure wing. WS: 74 in.; L: 50 in.; engine: .30; 2 to 3 channels; 1 sheet. **$19.95**

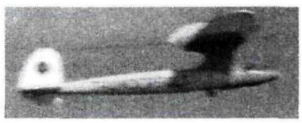


FSP01551
SE-5A
Chet Lanzo's standoff-scale version of the WW I fighter was first published in January 1955. Intended for rudder-only control, the plane features conventional built-up construction. WS: 46 in.; L: 37 in.; engine: .15; 2 channels; 1 sheet. **$14.95**

FSP12641
Swamp Box
This rudder-only sport airplane is easy to build and very stable. It would fit Vintage R/C Society events well. Bill Winter design features a sheet-balsa box fuselage and built-up wings. WS: 48 in.; L: 35 in.; engine: .09 to .15; 2 channels; 1 sheet. **$14.95**



FSP04801
Taylorcraft
This R/C "sort-of-scale" model of Duane Cole's clipped-wing T-Craft is really a pattern ship in disguise, but it's docile enough to be an intermediate trainer. The Hal deBolt design features his usual construction style in balsa and ply. WS: 55.5 in.; L: 41.5 in.; engine: .40; 4 channels; 1 sheet. **$19.95**



FSP08952
Thunderbolt
Designed by Hal deBolt, the Thunderbolt is an R/C version of the 1940 free-flight model. Constructed of balsa and ply, the fuselage has a tubular design and uses planking over formers. The model features a removable engine pod, requires a 3-channel radio and has a pull-out radio tray and retractable main gear. WS: 43 in.; L: 35.5 in.; engine: .15 to .23 glow. **$19.95**

FSP04781
Twin Lizzie O.H.M.
A larger version of a Keith Laumer "fun machine" from 1959—this time, for R/C. This Paul Denson airplane is quite easy to build and fly. WS: 58 in.; L: 58 in.; engine: .15 to .25; 3 channels; 1 sheet. **$19.95**

To order call (800) 537-5874
Foreign orders fax (815) 734-5827

FSP04813
Zipper
A two-plate plan that will permit the building of the 1939 Carl Goldberg plane for old-timer free flight or R/C-assist; no other source need be researched to make a completely accurate model. This replica, designed by Bob Larsh, faithfully duplicates the original model's structure. WS: 54 in.; L: 35 in.; engine: .29; 3 channels; 2 sheets; LD 3. **$24.95**

CONTROL LINE

FSP05772
1/2A Nobler
1/2A profile version of the most famous Ukie stunter of all time—George Aldrich's Nobler. Design by R. Sarpolus features simple sheet-balsa construction. WS: 27 in.; L: 19.5 in.; engine: .049; 1 sheet; LD 1. **$9.95**

FSP10803
El Diablo
A *Model Airplane News* "Golden Oldie" for control-line stunts, this design by Harold Reinhardt was first published in 1952. The all-balsa airplane should still turn heads at your local flying field. WS: 44 in.; L: 25 in.; engine: .35; 1 sheet; LD 3. **$14.95**

FSP06652
Lockheed P-38
This excellent control-line scale model designed by Don Yearout won a first prize at the 1964 Nationals. WS: 52 in.; L: 33 in.; engines (2): .35; 2 sheets; LD 4. **$14.95**

FSP01812
Martin B-10
This aircraft is rarely modeled—a real builder's project. The control-line scale airplane features a keel/former/planked fuselage and built-up, sheeted wings. Designed by Dick Hall. WS: 52 7/8 in.; L: 33 in.; engines (2): .35; 1 sheet; LD 4. **$19.95**

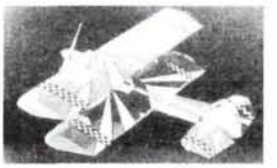
FSP07802
Messerschmitt BF110
A standoff-scale control-line model of a remarkably interesting aircraft. Built-up balsa construction is fairly complex but results in a fine flying twin. Designed by Walt Musciano. WS: 39.5 in.; L: 30 in.; engines (2): .15; 1 sheet; LD 3. **$14.95**

FSP08701
Oriental
One of the finest control-line stunters ever to appear on the pages of *Model Airplane News*. With today's trend toward downsizing Ukie stunt craft, it could still compete even after 20 years. Construction includes a built-up, D-tube wing, sheet tail and shaped slab-side fuselage. WS: 56 in.; L: 37 in.; engine: .35; 1 sheet; LD 3. **$9.95**

FSP06681
P-51D Sharpshooter
This scale version of the classic P-51 is one of the best scale models ever published in the pages of *Model Airplane News*. Intended for the control line, the Homer Hudson design would nevertheless make a nice, small R/C scaler. The airframe is completely built up of balsa and ply. WS: 46.5 in.; L: 40 in.; engine: .25 to .35; 1 sheet; LD 4. **$14.95**

FSP06621
Piper Comanche
A fine control-line scale model featuring an all-built-up, sheeted structure in balsa wood. This plan, designed by Florian Piorkowski, could easily be modified for radio control. WS: 49 in.; L: 37 in.; engine: .35; 2 sheets; LD 4. **$19.95**

FSP05582
Propjet B-47D
A fine control-line scale model that could be modified for use with R/C. This extremely interesting aircraft will turn heads at the flying field. WS: 54 in.; L: 43 in.; engines (2): .15; 1 sheet; LD 3. **$14.95**



FSP07793
Zephyr
An easy-to-build profile biplane that will draw a crowd wherever it's flown. The design, by Raymond Zarichak, features a sheet-balsa fuselage and built-up wings. WS: 40 in.; L: 30.5 in.; engine: .35; 1 sheet; LD 2. **$14.95**

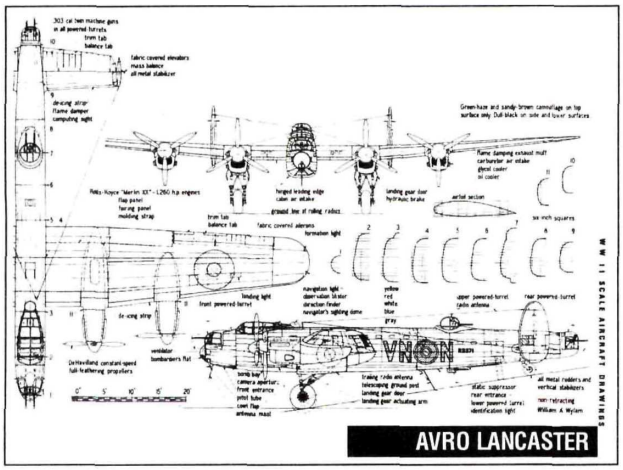
FREE FLIGHT

FSP10813
Brewster "Buffalo" F2A-2
A rubber-powered replica of a relatively obscure Navy fighter, this Mike Midkiff design has a fuselage built on a box with formers and stringers. WS: 27 in.; L: 18.25 in.; area: 140 sq. in.; power: rubber; 1 sheet; LD 3. **$14.95**

FSP12691
Fokker D-VII
This F/F scale design by Richard Meixell can easily be converted to R/C. This is a true scale airplane. WS: 43 in.; L: 34 in.; engine: .049; 1 sheet; LD 3. **$14.95**

FSP10732
Pietenpol Air Camper
A cute but classic design, this F/F scale replica would be ideal for small R/C. Sid Miller design features stick construction. WS: 35 in.; L: 21.5 in.; engine: .049; 1 sheet; LD 3. **$9.95**

SCALE DRAWINGS



Each scale drawing is an individually reproduced, high-quality blueline print from the original master Mylar. Plans consist of one or more sheets and are professionally reproduced. The Wylam drawings are 17x21 inches, and the Nye drawings are 22x34 inches.

WILLIAM WYLAM PLANS

(02001)
Albatros D-1 to D-6, 8 sheets **$29.95**

(02002)
Avro Lancaster 1, 1 sheet **$9.95**

(02003)
Beechcraft B17 to G17, 10 sheets **$29.95**

(02004)
Beechcraft 17 to A17, 4 sheets **$19.95**

(02005)
Bell P-59A Airacomet, 1 sheet **$9.95**

(02006)
Bell P-63A Kingcobra, 2 sheets **$9.95**

(02007)
Bleriot Channel Crosser XI, 1 sheet **$9.95**

(02008)
Boeing B-17G Flying Fortress, 2 sheets **$14.95**

(02009)
Boeing B-29 Super Fortress, 2 sheets **$9.95**

(02010)
Boeing FB-1 to FB-6, 4 sheets **$19.95**

(02011)
Boeing F2B -1/Plotting Taper Rib sections, 4 sheets **$19.95**

(02012)
Boeing F3B-1, 4 sheets **$19.95**

(02013)
Boeing F4B P-12, 4 sheets **$19.95**

(02014)
Boeing PW-9C to XP-7, 4 sheets **$19.95**

(02015)
Boeing 15 & XPW-9, 4 sheets **$19.95**

(02016)
Boeing C-97, 2 sheets **$9.95**

(02017)
Boeing XP-8, 2 sheets **$9.95**

(02023)
Curtiss A-12 Strike, 1 sheet **$9.95**

(02024)
Curtiss SBC-3 Scout Bomber, 2 sheets **$9.95**

(02035)
Curtiss Hawk XP-23, 2 sheets **$9.95**

(02039)
Curtiss Seahawk F7C-1, 2 sheets **$9.95**

(02040)
Curtiss Seahawk XF7C-3, 1 sheet **$9.95**

(02041)
Curtiss EF13C-1 & XF13C-2, 1 sheet **$9.95**

(02042)
de Havilland DEH-4 biplane, 4 sheets **$19.95**

(02049)
Ford Tri-Motor 5-AT-C, 4 sheets **$19.95**

(02056)
Lockheed Vega, 4 sheets **$19.95**

(02057)
Lockheed Sirius, Altair and Orion, 4 sheets **$19.95**

(02058)
Lockheed Hudson (Britain's) 3-view, 2 sheets **$9.95**

(02061)
McDonnell XP-67, 1 sheet **$9.95**

(02062)
Messerschmitt ME-109J, 2 sheets **$9.95**

(02067)
Pfalz D-3, 4 sheets **$19.95**

(02071)
Republic P-47D Thunderbolt, 2 sheets **$9.95**

(02074)
Sopwith Camel, 3 sheets **$14.95**

(02076)
Sopwith S.E. 5A, 3 sheets **$14.95**

(02088)
Stinson Reliant Gull Wing, 10 sheets **$29.95**

(02089)
Stinson Airliner Model T, 2 sheets **$9.95**

(02090)
Stinson Airliner Model U, 3 sheets **$14.95**

(02097)
Vultee Swoose Goose XP-54, 1 sheet **$9.95**

(02098)
Waco Model C-6 & D-6, 2 sheets **$9.95**

(02100)
Westland Lysander, 4 sheets **$19.95**

(03005)
Pratt & Whitney Wasp Jr., 3 sheets **$14.95**

(03006)
Wright Whirlwind, 3 sheets **$14.95**

(03007)
Lewis Machine Gun, 1 sheet **$9.95**

WILLIS NYE PLANS

(04005)
Boeing Mailplane 40B, 4 sheets **$24.95**

(04007)
Chance Vought VE-7&UO-1, 4 sheets **$24.95**

(04010)
Curtiss Navy NC-4, 4 sheets **$24.95**

(04012)
Douglas TED-1, 4 sheets **$24.95**

(04016)
Gotha Bomber, 4 sheets **$24.95**

(04020)
Handley Page 01400, 4 sheets **$24.95**

(04025)
Loening US Amphibians PTS, 8 sheets **$34.95**

(04034)
Thomas Morse S4E, 4 sheets **$24.95**

PLANS DIRECTORY INDEX

 by Gerry Yarrish

Sizing up warbirds

WARBIRDS ARE models that translate well into larger formats, and when I say larger formats, I mean 72-inch spans and bigger. There seem to be fewer and fewer 60/60 (.60-size engine and 60-inch wingspan) warbirds showing up at the flying field these days, and if I were to venture a guess, I'd say that the average size of a large warbird is about 90 inches. Larger and smaller models are, of course, also around, but today there are more kits and semi-kits available for giant-size warbirds than you can shake a sheet of balsa at.

For me, the 80- to 85-inch-span warbird makes good sense. At this size, models begin to benefit from larger wing areas and so tolerate higher wing loadings. "Bigger flies better" is the battle cry, isn't it? Gas engines fit more easily within the model's nose, and in general, the 80-something model is big enough to be impressive while still remaining fairly easy to transport. They also cost less to build when compared with your typical 100-inch warbirds. Where's the downside? I think big-name companies are also finding this out, and the proof is on the hobby shop shelves.

The big Gold Edition P-51 Mustang from Top Flite. This one was built by Bill Steffes and is seen at the WMWA warbird fly in at Kirkwood, NY. Span is 84.5 inches.

BIG GOLD EDITION MUSTANG

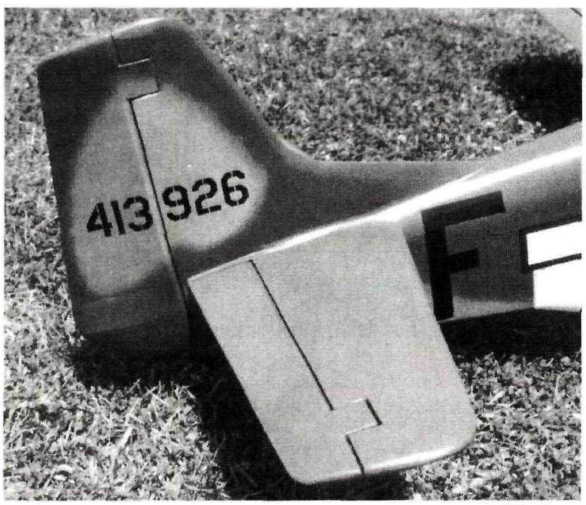
By now, most of us have heard of the 1/5-scale Top Flite* Gold Edition Mustang. Since I have flown both the 1/7-scale Gold Edition P-51 and P-47 Thunderbolt, I was very pleased to see that with the new Mustang, Top Flite had turned its attention to bigger warbirds. With an 84.5-inch span, 1,245 square inches of wing area, a 17.5- to 19-pound, ready-to-fly weight and a 36.9 ounces-per-square-foot wing loading at 20 pounds, the big P-51 looks pretty inviting. Flying buddy Bill Steffes had started a "Field and Bench" on the big Mustang but unfortunately, the test P-51 was done in by radio problems before a full evaluation could be done. Here's what he found.

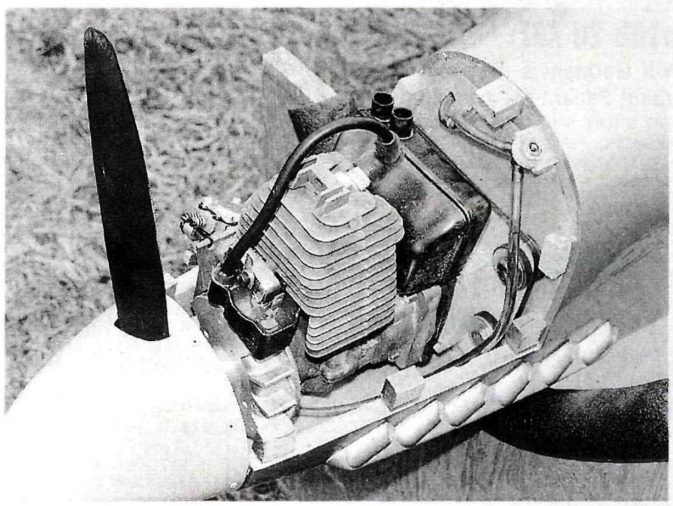
At first glance, Bill thought that the Mustang would end up weighing more than the advertised weight. But after completing it, Bill was pleased that with a simple MonoKote*-and-paint finish, the P-51 weighed exactly 20 pounds.

Construction is typical for a Gold Edition kit, and the parts fit is very good. The design is straightforward and fairly uncomplicated for a warbird that's equipped with flaps and retractable landing gear. Though it took slightly longer to build than Bill had anticipated, he was very pleased with the outcome.

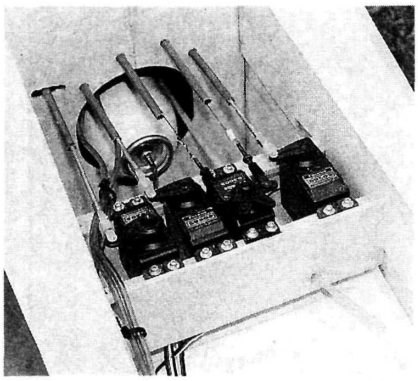
ENGINE AND ACCESSORIES

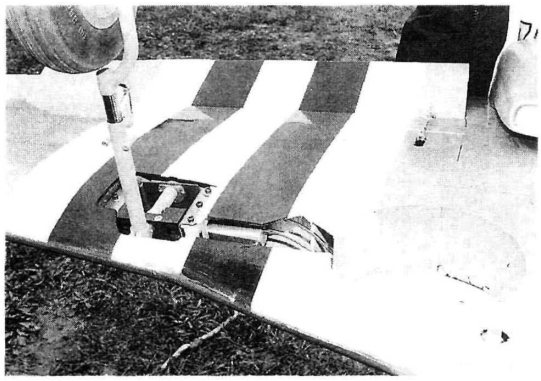
For power, the P-51 was outfitted with the U.S. Engines* 41cc gasoline engine. The U.S. 41, including its canister-style muffler, fits almost completely within the removable chin cowl. There wasn't enough time to properly sort out





Near right: the Mustang's tail feathers are built up and airfoil shaped. Bill covered his P-51 with silver MonoKote and sprayed it with olive drab LustreKote. Far right: the U.S. Engines 41cc gas engine fits nicely in the big Mustang's cowl.





Above left: there's a ton of room inside the big Mustang, which makes access and maintenance of the radio gear a snap. Above right: Robart pneumatic retracts are a perfect match to the big Mustang's wing.

the engine and prop combination, but properly broken in and propped, the U.S. 41 should produce adequate power for the Mustang. In speaking with Great Planes* about its newest big Gold Edition warbird—the F4U Corsair—we were told that the U.S. 41 is powerful enough for their big bent-wing warbird, and this plane weighs 25 pounds.

Robart* pneumatic retracts are a perfect fit for the Mustang and add greatly to the scale look of the model. Bill went to the trouble to add a Robart retractable tailwheel.

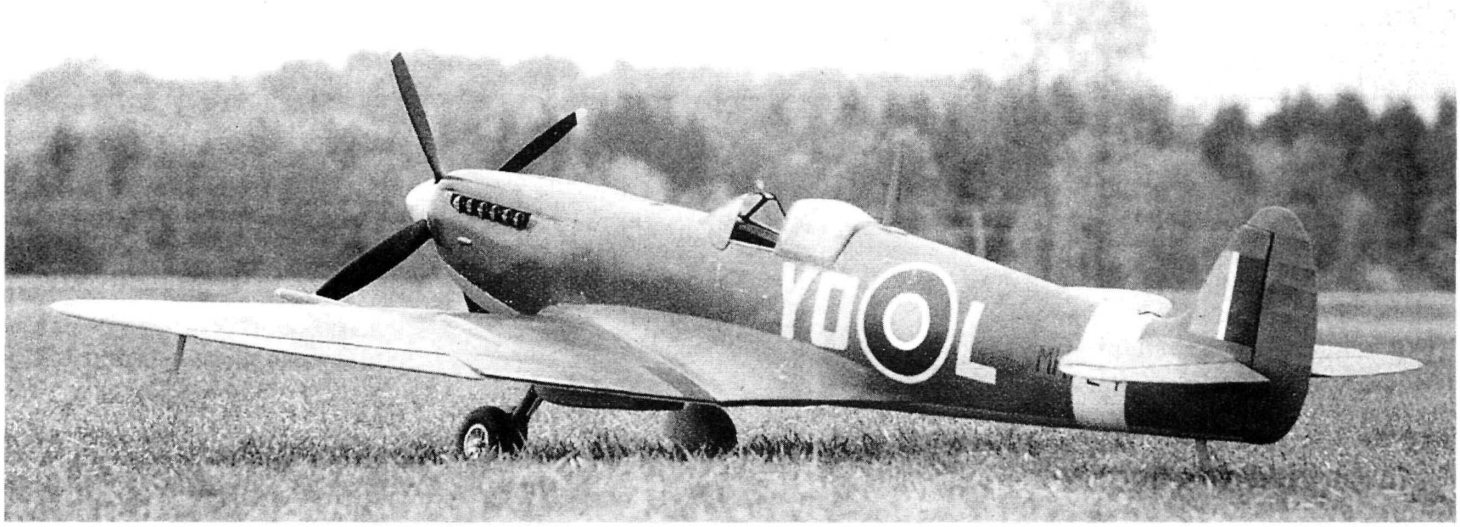
Flaps are included on the plans, and there's no reason not to build them into your wing. Also, the wing-to-fuselage fairing is a must-do for a good-looking warbird.

Bill used 10 servos in the Mustang, including a separate servo for each flap and aileron, two standard servos for the elevator (one for each half), and one each for throttle, retract valve, rudder and the tailwheel steering. The wing is fully sheeted, and the kit comes with extra-wide balsa sheeting to minimize the number of seams. The tail feathers are built up, airfoil-shaped surfaces. The finish is silver MonoKote with an overspray of olive drab LustreKote*. Black and white invasion stripes give Bill's Mustang an authentic "Normandy invasion" look.

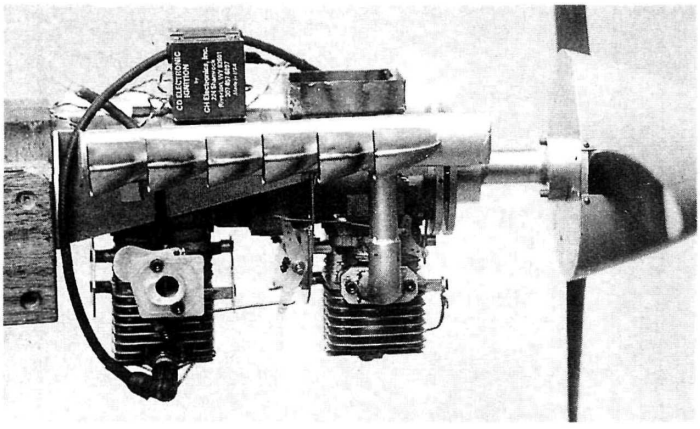
With a 1/5-scale Mustang and Corsair in the Top Flite hangar, those who think big have two good reasons to consider a warbird for their next project—if only they'd come out with a big P-40 Warhawk!

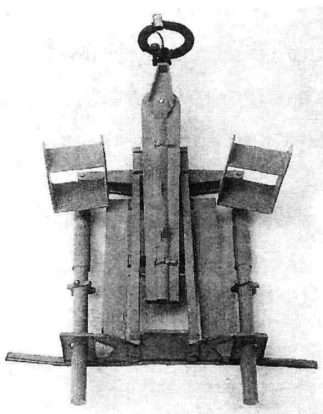
CANADIAN SPITFIRE

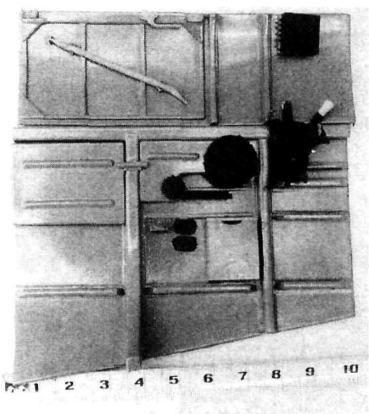
If you like your warbirds big—and I mean really big—our northern friends at Clark Industries* offer a very complete package. Though not brand-spanking new, their 1/4-scale, 42-pound Spitfire surely would look impressive sitting on anyone's flightline. Available in both the Mk IXB and Mk XII versions, the Clark Spitfire kit comes complete with engine and retractable landing gear. The fuselage is made of hand-laid fiberglass and polyester resin and features all the panel lines molded in. The firewall and wing



Above: the 1/4-scale Supermarine Spitfire from Clark Industries is a big, impressive warbird; 112-inch span. Below left: the Clark Industries Merlin engine. Twin, in-line cylinders and functional scale exhaust stacks make for an impressive addition to the Clark Spitfire. Below center and right: some of the many scale cockpit parts available for the Spitfire.







blocks come factory installed, and the Spit features internal air ducting for engine cooling. The 112-inch-span wing is built up, and the Clark Failsafe retractable landing gear have stout, 7/8-inch-diameter Oleo struts and a retract cycle rate of 3 to 4 seconds. Twin actuators move the gear, and 5.5-inch Du-Bro* tires complete the landing gear. As the name implies, if air pressure is lost, the gear come down and lock into place. A scale cockpit kit containing over 100 pieces is also available.

The Spit can be powered by the Clark Merlin 105.6cc 2-stroke, in-line gas engine complete with ignition and scale exhaust stacks for a truly impressive package. At $3,700 (Canadian), the kit and the engine—$2,200—may not be cheap, but you get an awful lot of quality for your money.

Clark Industries also offers an extensive line of wood propellers that range from 12 to 36 inches in diameter. Solid hard birch is used for the standard props, while laminated birch and cherry are employed in the line of WW I propellers. A little-known fact is that Clark Industries also makes custom wood props (up to 7 feet in diameter) for full-size home-built and ultralight aircraft.

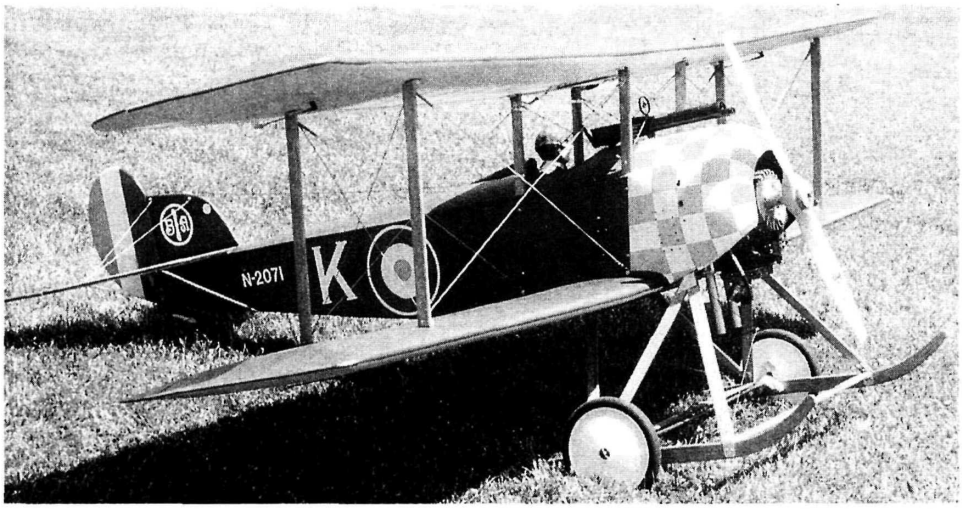
If the Spitfire doesn't float your boat, how about the new Clark Industries Hawker Hurricane? The Clark Merlin engine can also be used for power with this beauty.

Other warbird kits in the works are a 1/4-scale Hawker Hurricane that can also be powered by the Clark Merlin engine, and a 1/4-scale Fokker D-VII.

BIG WW I BIPES

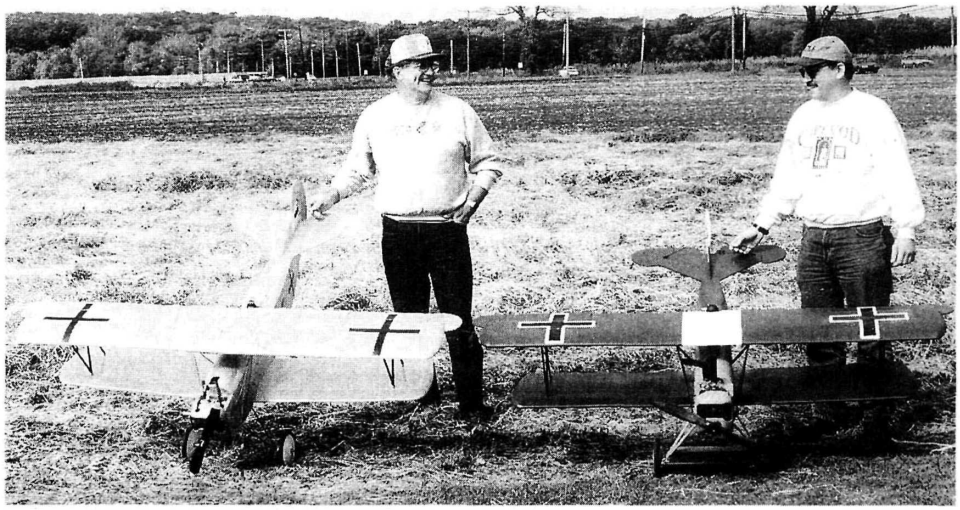
If WW II heavy-metal warbirds are a little too much for your flying style, then you can always switch gears a little and try a WW I biplane. Biplanes with wingspans of 70 to 75 inches are very nice-size big models. This size bipe is a very good match for a Zenoah G-38 or Quadra 42 and is just the right size to fly on an every-weekend basis. My first big bipe was a Uravitch-designed Fokker D-VII from the Aeroplane Works* kit, and I had a great time strafing the trenches until I sold it to a flying buddy. There are several other WW I bipes in this size range, and it's not difficult to find one. If you've ever heard of Rhinebeck, NY, then you know that flying wires and turnbuckles add much to a 2-wing airplane. I really do love biplanes of all types, but if I were forced to decide on only one type of model to build and fly, it would be a biplane, for sure.

Well, I'm afraid that's it for now; keep the email and letters coming in. I can be reached care of the magazine, or at gerryy@airage.com. See ya.



John Tanzer's 77-inch Sopwith Baby is an unusual but very attractive choice for a WW I biplane. John's model will be the subject of a future Model Airplane News construction article.

**Addresses are listed alphabetically in the Index of Manufacturers on page 174.*



The 75-inch span Fokker D-VII designed by Rich Uravitch is a great first big biplane. Powered by a Zenoah G-38 or a glow SuperTigre 2500, this design is perfect for the Rhinebeck Jamboree. Shown are flying buddies Sal Manganaro (left) with my old Fokker and Ron Whitlock with his version of the Uravitch D-VII.

by Chris Chianelli

MDS is Back!

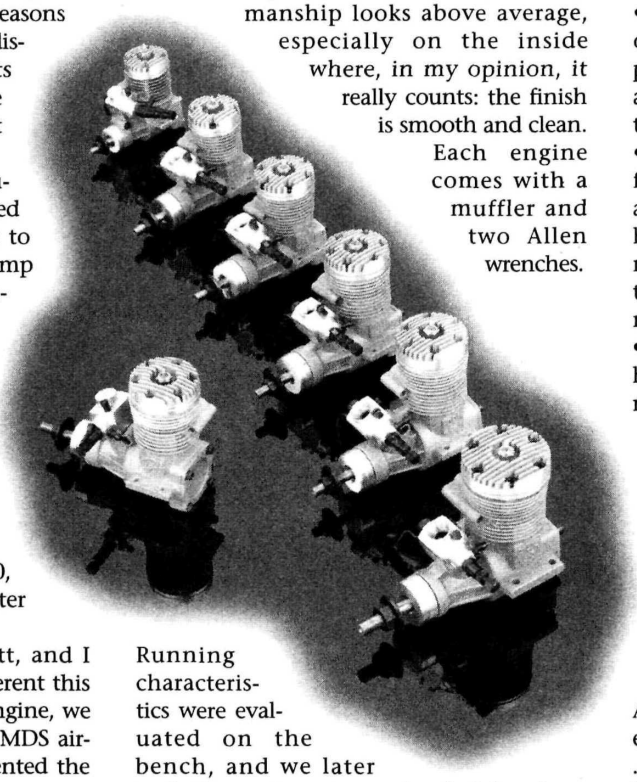
MDS engines were introduced in the States a few years back. At the time, many modelers, including me, were immediately struck by their hand machining and overall robust look; in fact, every one was handmade by Russian craftsmen. Then, just as we began to take an interest in the engines, for reasons that never became clear, the line disappeared. Well, these powerplants have now returned in force and are backed by one of the USA's largest distributors.

When Horizon Hobby Distributors* announced that it had acquired MDS, it declared its commitment to the MDS line; it promised to revamp manufacturing techniques, fine-tune and improve the designs and improve overall quality control. After close inspection, compared to the orginal designs, I can tell you these MDS engines are totally new engines—inside and out.

MDS manufacturing facilities now incorporate CNC technologies and, thus far, the line includes aircraft engines in .18, .28, .38, .40, .48, .58 and .68 sizes and helicopter engines in .38, .48 and .68 sizes.

My engine partner, Vic Olivett, and I decided to try something a bit different this time. Instead of focusing on one engine, we thought we'd run all seven of the MDS aircraft engines on props that represented the middle of their recommended-prop ranges and then show our findings; in fact, we decided to pack more *usable* information into the two pages allotted to "Air Power." The design and construction techniques are basically the same on all the engines tested (displacement is the main difference), so we thought this an appropriate thing to try. Let me know what you think; email me at: chrisc@airage.com.

Like the original MDS engines, these newer models make a very good first impression, only more so. The quality of workmanship looks above average, especially on the inside where, in my opinion, it really counts: the finish is smooth and clean. Each engine comes with a muffler and two Allen wrenches.



Running characteristics were evaluated on the bench, and we later took the engines to our local club, where members were more than happy to check out their performance (see some of their comments later). Bench results on idle, top end and static thrust are shown in the chart.

We were sent these engines while each was still going through R&D, and Horizon asked us to report on anything that could be improved. Overall running and starting characteristics were very favorable, but we did encounter a few problems.

PROBLEMS

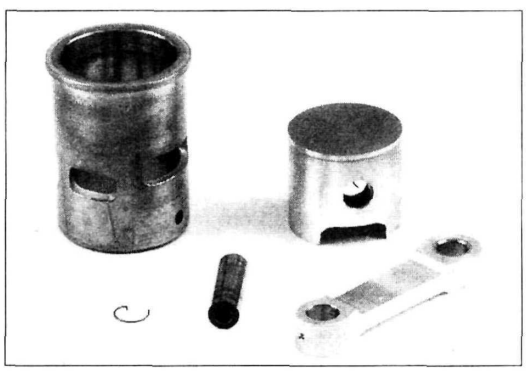
- **.18**—at first, this would not run because of a leak on the backplate. When the backplate was installed, the O-ring was pinched, and this allowed an air leak. We realigned the O-ring, and the engine ran well.
- **.40**—when running at top rpm, it leaked fuel between the carb and the needle-valve assembly, and this made the engine run hot. We removed the needle assembly and resealed it with Teflon tape. The leak was totally eliminated, and the engine ran much cooler.
- **.40 and .58**—our needle-valve springs had to be bent inward to prevent the needle-valve from changing settings at high rpm. We recommended that Horizon make these of a stiffer material.

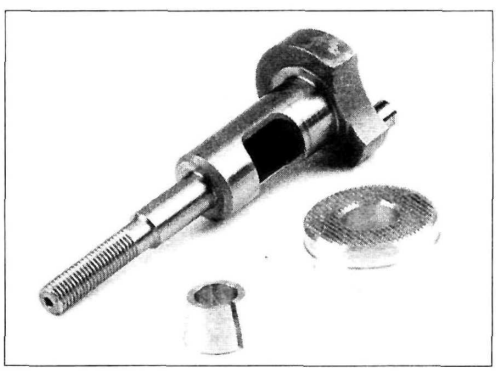
Early in our test period, we told Horizon about these problems and—to quote them—they "got right on it." In the past, Horizon has always responded quickly to observations designed to improve a product.

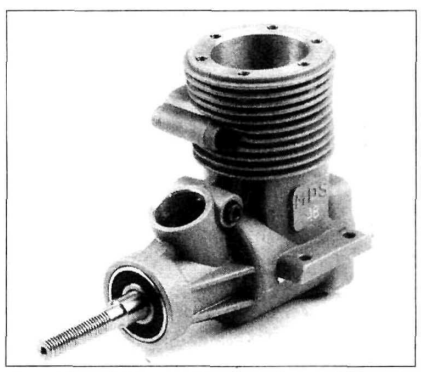
INTERPRETING THE CHART

As you can see from the figures, all of the engines ran strongly, especially the .28, .48 and the .68. The .68 is a real powerhouse and flew a 14-pound airplane with authority—not bad.

And what did the fliers at our club have to say? Comments went like this: "Easy starting"; "Very quiet, especially at idle"; "Very low vibration—extremely smooth."







Left: the piston/sleeve assembly is true ABC technology: a high-silicon aluminum piston runs in a chrome-plated brass sleeve. The wristpin is held in the piston with E-clips; the machined rod sports oil ports at both ends, and the lower end is bronze-bushed. Center: the machined thrust-washer is held on the crankshaft with a tapered split collet. Right: the one-piece-investment-cast crankcase houses two ball bearings to support the one-piece crankshaft. All of the exhaust-stack muffler mounting holes match O.S. sizes, so you'll have a wider choice of mufflers and headers—nice touch. Note that the front ball bearing is sealed to keep dirt out and lubrication in. The carburetor is held firmly in the crankcase with an igneous split retainer.

TEST CONDITIONS

Temperature: 83 degrees
Humidity: 74%
Pressure reading: 29.92
Elevation: 220 feet above sea level

Fuel used: Power Master* 15%

Glow plugs: Hangar 9* no. 2 performance plug

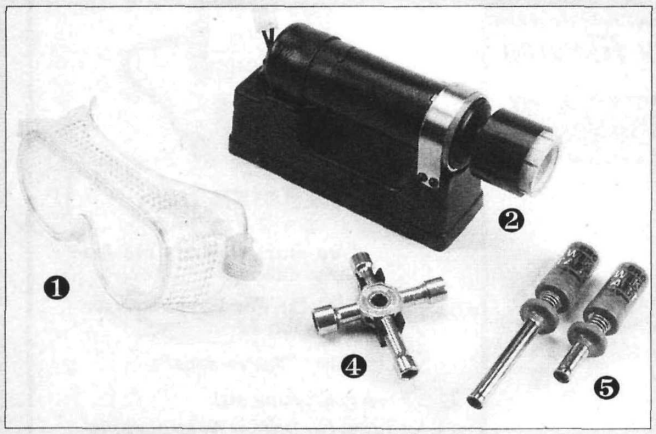
Props: APC* and Master Airscrew*

Bench-test results

Engine displacement	Prop	Idle rpm	High rpm	Static thrust (lb.)
.18	9x4	2,760	12,720	2.3
.28	9x6	2,720	12,940	3.4
.38	10x5	2,660	13,520	4.1
.40	10x6	2,740	12,840	4.4
.48	10x7	2,660	13,680	5.2
.58	11x6	2,760	13,280	6.8
.68	12x6	2,840	12,620	9.3

RECOMMENDED EQUIPMENT

I know some of you guys want to do some engine testing of your own, so here's some support gear that works well. I've been running model R/C engines for 29 years, and I've used lots of support gear over that time. I thought some of you might like to benefit from my experiences. Here's what I use.



❶ Good-quality protective eye wear should be number one on the list, for obvious reasons. Before you use anything else shown here (except for possibly no. 3), make sure you're wearing shatterproof goggles.

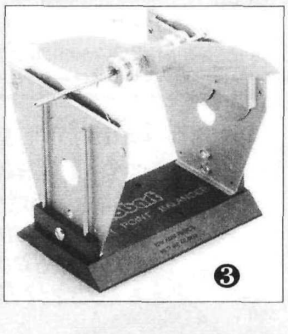
❷ Hobby Lobby's* Planetary Starter with the Ni-Cd holder. Not only is it a safety advantage not to have a long cord waving around a spinning prop, but the 10-cell Ni-Cd pack really packs some amps for cranking power.

❸ Robart's* High Point Prop Balancer. Vibration is the enemy. Deal with it by balancing your props, preferably on a precision unit such as this.

❹ Du-Bro's* four-way socket wrench.

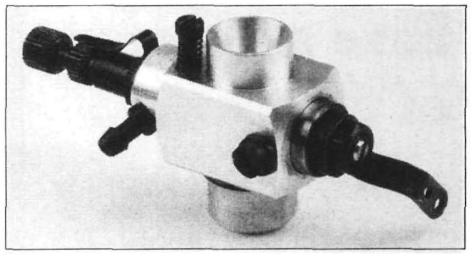
❺ Du-Bro's standard and long-reach Kwik-Start glow-plug lighters.

❻ Nothing can make running engines more annoying than a cranky, inaccurate tachometer. I use a TNC Digital Sensi-Tach. TNC* tachs are rock-steady, dead-on accurate, super easy to use and only a little (not a lot) more expensive; they're worth every penny. Simply put, TNC is the best, in my humble *opinion*.

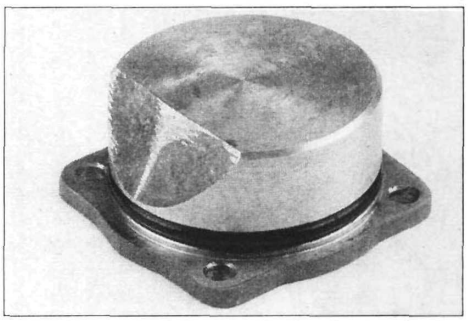


❼ Enforcer Mfg.'s glow-plug caddy. I run a lot of 4-stroke engines, and with 4-stroke plugs costing upwards of 10 bucks a shot, I don't want the things rolling around in a mixture of rancid castor oil and runway "mung" at the bottom of my flight box! The reusable white strips allow you to label and relabel your plugs, and the viewing windows on the bottom protect the delicate element coils and allow you to view them when test power is applied.

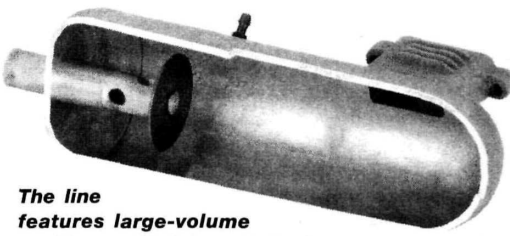
I've made many mistakes over the years, guys, but this time I can tell you this is all good stuff.



The carburetor is reminiscent of Webra's reliable TN (twin needle) design—one of my all-time favorites. The idle-stop and helical-slot pin-guide functions have separate screws. Obviously, this is more expensive to manufacture, but it's a much better way to go than assigning both functions to one screw.



MDS has opted for an O-ring instead of a paper-gasket crankcase/backplate seal. This not only seals better, but it's also more reliable because O-rings don't rip. If you ever have to remove the backplate, this is a great feature to have.



The line features large-volume mufflers with internal diaphragm baffle. While the units' size makes them quiet, some may feel that MDS has overdone it—to the detriment of a model's appearance (especially if it's scale). If you think this, you'll be happy to know that all exhaust-stack muffler mounting holes were designed to match O.S. engines of similar displacement, and this gives you a wide variety of alternate mufflers and headers from which to choose—good thinking!

They liked them so much that we let them keep 'em!

Has Horizon kept its promise of commitment to the betterment of the MDS line? The engines we ran—"exhibits" one through seven (hard evidence, as it were)—seem to prove that the people at Horizon are delivering on their promise.

**Addresses are listed alphabetically in the Index of Manufacturers on page 174.*

Fuel Tanks for Electrics

People are familiar with fuel tanks for glow and gas engines; they're simple devices that hold a visible liquid, and the tubes in and out of them are easy to understand. When it comes to nickel-cadmium cells (the fuel tanks of electric airplanes), things become a bit less clear. That's not bad in itself, as you don't have to understand the internals of a Ni-Cd to fly electric airplanes, but when you mix this lack of familiarity with Ni-Cd supplier nomenclature and the loose use of jargon when electrics guys talk about cells, it sometimes becomes a struggle. Both Greg Gimlick and I have received email from guys with cell nomenclature questions—some as a result of the charts published in Greg's October '98 column. In that column, the number and capacity of cells was reported, but not the type of cell. This is the "loose use of jargon" I was referring to, as for "people in the "know," the statement, "I used 12-1700s" is self-explanatory, even though it is an incomplete description of the battery used. So I'd like to discuss some of the basics of Ni-Cd nomenclature and jargon so we can minimize the confusion and maximize the fun of flying electrics.

CELL SIZE

There are really two properties of cell "size" that are important to us. First and foremost is the capacity of our "fuel tank" (cell). With both Sanyo and SR cells, the number associated with the cell name (e.g., SR1100, Sanyo 1700SCR) is the capacity of the cell in milliamp-hours (mAh). Using a Sanyo 1000SCR as an example because it makes the arithmetic easy, a 1000mAh capacity means that we can draw 1000mA from that cell for one hour before it will be depleted. There are some subtleties that I'm ignoring here, but they aren't important for our purposes. Milliamp-hour values are convenient for most Ni-Cd applications but are not particularly useful for us, as we typically draw many amps from our cells for a few minutes. But some simple unit conversions can give us more useful numbers. I take the easy way out and you should, too. If you simply take the mAh capacity of a cell, lop two of the zeros off it and multiply by 6, you'll end up with the number of amp minutes the cell can provide. For our 1000mAh cell, that would result in the simple arithmetic of 10x6 = 60 amp minutes. For a 1700SCR, we'd get 17x6 = 102 amp minutes, and 600mAh cells could provide 6x6 = 36 amp minutes.

With a capacity, it's easy to calculate the duration you can expect if you draw 20 amps from the cells. Sanyo 1700s will provide 102÷20 = 5.1 minutes. This doesn't take into account throttle management, but most people calculate full-throttle duration and realize that actual flight time will be much longer.

Physical size of the cells is another matter and one not to be taken lightly. Unfortunately, Sanyo's nomenclature only helps a little in this area. The first letter(s) of the Sanyo labeling scheme refer to the diameter of the cell. A 600AA cell is an "AA" cell (14.2mm diameter) that you use in small flashlights. The "SC" in Sanyo 1700SCR stands for "sub-C"; it represents a cell diameter of 23mm (just under an inch). Another commonly used size is "A" (17mm). The problem with this scheme is that these labels tell you nothing about either the height or weight of the cell. A 650SCR is 26mm high, while a 1700SCR is 43mm high, and a 1700 weighs nearly twice what the 650 weighs. I've included a short table of some of the popular sizes of cells, along with their sizes and weights; this should help you select cells for your project.

CELL SIZES AND INTERNAL RESISTANCES

CELL MODEL	DIAMETER (mm)	HEIGHT (mm)	WEIGHT (g)	INTERNAL RESISTANCE (milliohms)
500AR	17	28	19	9
600AE	17	28	21	10
600AA	14.2	50	24	12
800AR	17	50	34	6
1000SCR	23	34	42	4.5
1200AE	17	50	34	7.6
1400SCR	23	43	53	4
1700SCR	23	43	54	5.2
2000SCR	23	43	57	5.2

CELL TYPE

All Ni-Cds are not created equal! Not only do they differ in their capacity; they differ in their internal structure. The important thing about these internal differences is that Ni-Cds can vary in the way they take a charge and how they give up a charge.

There are three classes of Ni-Cds. These are "regular," "extended" and "rapid-charge" cells. Sanyo identifies these by placing an "E" in the designation of an extended cell and an "R" for rapid-charge cells. So, a 1300SC is a regular sub-C cell, a 600AE is an extended A-size cell, and a 1700SCR is a sub-C cell that can be rapid-charged.

One difference between the cell types is their internal resistance. Internal resistance varies with cell size, too (larger generally means lower internal resistance), but for a particular cell size, regular cells will have the highest internal resistance, rapid-charge cells will have the lowest internal resistance, and extended cells will be in the middle somewhere. It's typically the case that extended cells will have a higher capacity for their size than either regular or rapid-charge cells.

Let's assume we want to build a 7-cell pack of small cells to power a Speed 400 model and look at how these types present potential tradeoffs. The cells typically used are either 500AR, 600AE, or 600AA cells. The small table presented here will help with our discussion. Note that the cost of the regular cells is much lower than the cost of rapid-charge cells and that the extended cells are between the other two in price; "cheap" goes to the regular cells. But the rapid-charge pack weighs 1.2 ounces less than the regular pack. That may not seem like much,

but it's nearly 10 percent of the weight of a typical Speed 400 airplane.

The internal resistance of the rapid-charge cells is much lower than for regular cells. This is what makes them rapid charge. This translates into benefits on the flying field, as typical charge times for 500AR packs will be shorter than for 600AA cells (see below). What often happens is that flyers, being the impatient creatures that we are, push the charge rate of the AA and AE cells, and the cells get damaged.

But weight and charge time aren't the only differences between these types of cells. Those of you following closely will note that the rapid-charge cells I used in the comparison have a lower stated capacity than the other two types of cell. If you're really thinking, you're probably saying "Yeah, but I'll get more duration from the 600s, regardless of type, than I'll get from rapid-charge 500s." But, as it turns out, that isn't necessarily the case. Because rapid-discharge cells have lower internal resistance, they give up their charge more efficiently (losses during discharge show up as battery heat), so more of the capacity of the cell gets to the motor. Another way of looking at it is that the rapid-discharge cells will maintain a higher voltage to the motor than regular cells under the same load and thus, you'll get higher rpm at the prop. Obviously, if you know where the throttle is on your transmitter, you can reduce the current from the battery and get the same rpm as you'd get from AA cells at a higher current, thus draining the rapid-charge cells more slowly. Most of us have found that whether we use 500AR or 600AE cells, we get about the same duration.

So, in the end, the rapid-charge cells have a lot of virtues, though they are the most expensive. The extended cells are often useful in larger, low-power airplanes because a 1200AE cell weighs only two thirds what a 1200SCR weighs. So if current draw is kept below about 15A, these cells are sometimes ideal.

CELL TYPES AND THE PROPERTIES OF A 7-CELL PACK

CELL TYPE	7-CELL WEIGHT (oz.)	PACK RESISTANCE (milliohms)	COST ($)	CHARGE RATE (amps)	DISCHARGE RATE (amps)
Rapid (500AR)	4.7	63	28	2A	Very quickly
Extended (600AE)	5.2	70	20	1.5A	< 15
Regular (600AA)	5.9	84	16	1A	< 10

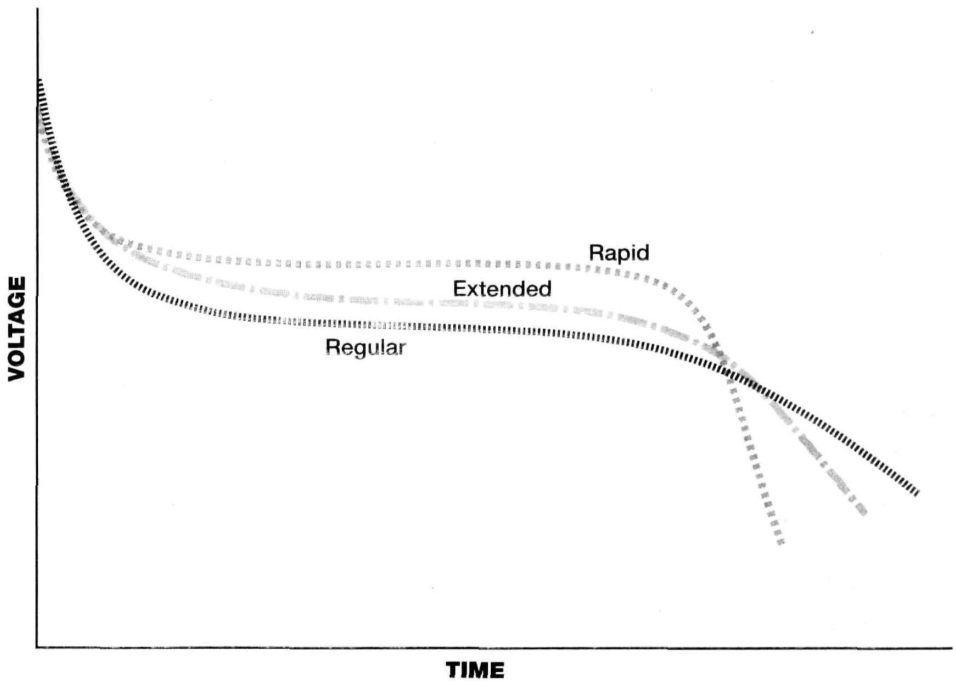
DISCHARGE DIFFERENCES

I've ignored one difference until now, but not because it isn't important; in fact, quite the contrary, as the most important difference between the cell types is how they discharge over time.

We use regular Ni-Cds in our transmitter and receiver packs because we want to be able to charge them and then let them "sit" while we drive to the field, stand around in the pits having coffee with the guys, etc. We wouldn't be too happy with a cell that would happily self-discharge and be flat when we went to fly. Regular Ni-Cds "sit" very well, mostly because of their high internal resistance. Rapid-charge cells on the other hand will readily give up their charge (a good thing when you want to suck 20 to 30 amps out of them to power an electric motor), but they will also self-discharge if you let them sit for any length of time.

But another difference between the cell types is the temporal nature of discharge under load. I've drawn a simple graphic to illustrate the discharge curves of the three types of cells. Note that all start at some high, full-charge voltage and end in a discharged condition. The important thing to note is the middle portion of all three curves, as that's where most of the flight of an electric airplane takes place. With rapid-charge cells, this middle part of the discharge curve is nearly flat, meaning that you have the same power at all times. This is really beneficial if you want to fly aerobatics in the fifth minute of your flight in the same way as you did in the second minute. Compare that to the extended's curve. Note that here, the voltage available to the motor declines as the flight progresses. The result is that you have less power available toward the end of the flight, as power availability declines almost continuously throughout it. This isn't a problem if you fly a Piper Cub that's throttled back most of the time, as you will simply have to advance the throttle a bit more at minute five than you did at minute two, but the flight characteristics of the aircraft will be the same.

One other thing to notice about these curves is what happens at the end of a

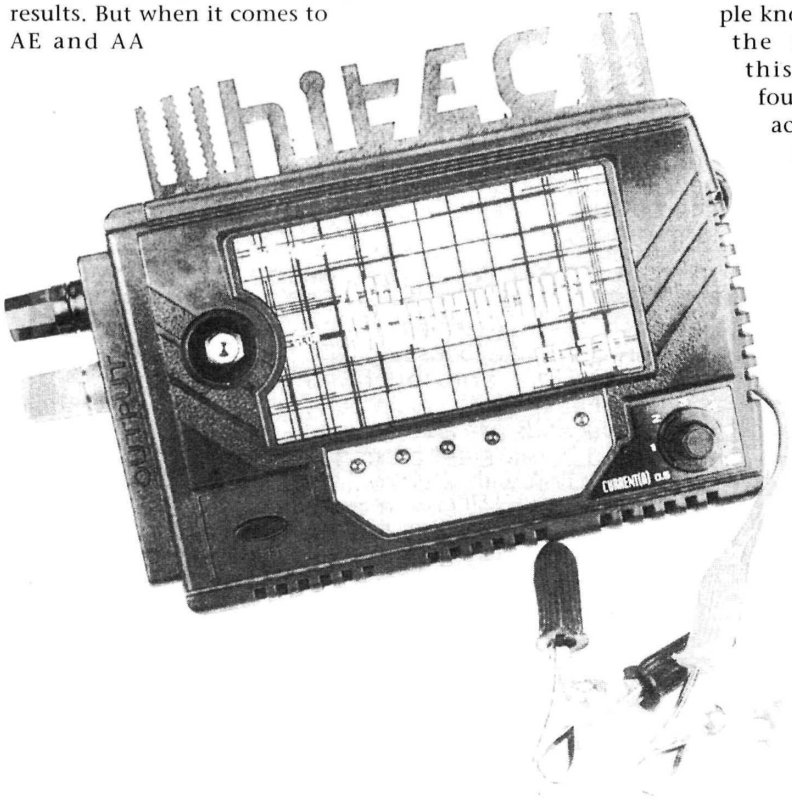


flight. With the extended cells, the voltage will lag to a point at which you'll have to land, and often, that point will occur before the cells "dump" (the point at which the voltage declines rapidly). With the rapid-charge cells, however, you have nearly full voltage until the cells dump, and when that happens, you're dead-stick, or nearly so. The saving grace here is the absolute repeatability of electric power. Once you've determined where the dump point is in your typical flights with a particular aircraft, you can simply set a timer and be on the ground or at least on approach when the cells dump.

CHARGING DIFFERENCES

The same difference (internal resistance) that causes discharge differences between various types of Ni-Cd affects their ability to take a charge. The higher the internal resistance, the slower you must charge. Typical nomenclature for discussing this is the "C-rate" of a particular cell. People often talk about charging standard transmitter and receiver Ni-Cds using a "C10 rate." This means that you take the capacity of the cell and divide it by 10 to decide the charge rate. Thus, for 500mAh cells, the C10 rate is 50mAh, which is what the simple chargers that come with radio systems provide. The result is that a full charge requires 10 hours—not something you want to wait for between flights.

Sanyo recommends charging the "R" cells at a C4 rate. For 500AR cells, this means 1.25 amps, whereas 1700SCR cells should be charged at 4.25 amps for best results. But when it comes to AE and AA cells, charge rates should be lower—a C6 or C8 rate. Thus, 600AA cells should be charged at 1 amp or less. Most guys I know are pretty conservative when charging AE and AA cells but will push the C4 recommendation for R-type cells and charge the 500AR cells at 2 amps and 1700SCRs at 5 amps.

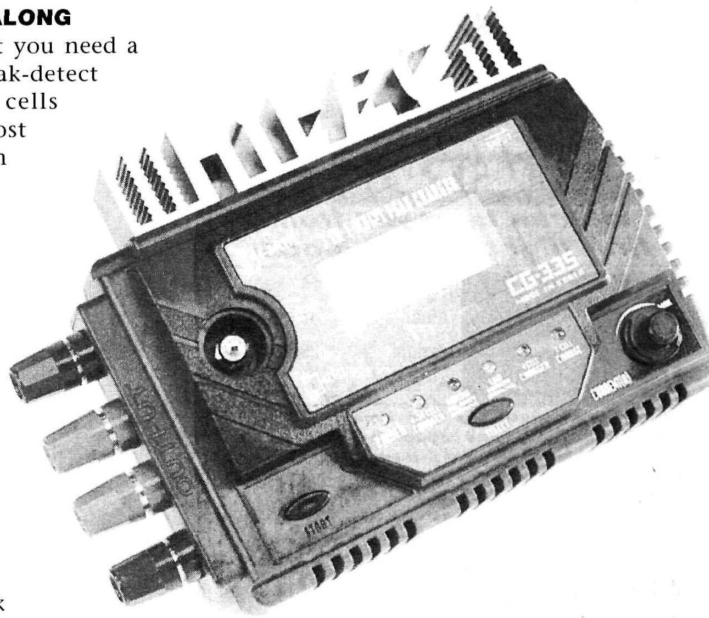


CHARGING ALONG

All of this suggests that you need a good, variable-rate, peak-detect charger to treat your cells well and to get the most from them. In fact, in my view, to enjoy flying electric airplanes, you need such a charger so that it will keep track of your charge and give you a full fuel tank while you're off flying or talking with friends.

Hitec* has just brought two noteworthy new chargers to market. The CG-330 and CG-335 delta-peak detect chargers are capable of charging from 4 to 24 cells. Both include a port for charging a glow igniter (for those of you who also fly glow planes), and the CG-335 has a port for charging receiver packs while you charge the flight pack.

Both allow current adjustment from 0 to 5 amps with a simple knob. In checking the markings on this knob, I've found them fairly accurate, though once you start loading up the charger with lots of cells, the current at any particular setting will drop off some. This is not surprising, as all chargers I have experience with do this. What is surprising is that the people at Hitec tell you about it; they claim you can charge 24 cells with a maximum current of 3 amps.



I did some simple tests using a deep-cycle marine battery as a source, 1700SCRs as a charge target, and an AstroFlight* Whattmeter to measure current. My results indicate: 7 cells—5.6 amps; 14 cells—4 amps; 17 cells—3.6 amps; 24 cells—2.7 amps (at the max current setting). One of the nice features of these chargers is that they can charge at very low currents. I've used this feature to peak-charge my slow flyer, which uses very small cells, and small charge currents are required.

A basic difference between the CG-330 and CG-335 is that the CG-335 has a digital display. While in operation, this display shows the charge voltage. Pressing a button in the middle of the charger results in a display of the charge current.

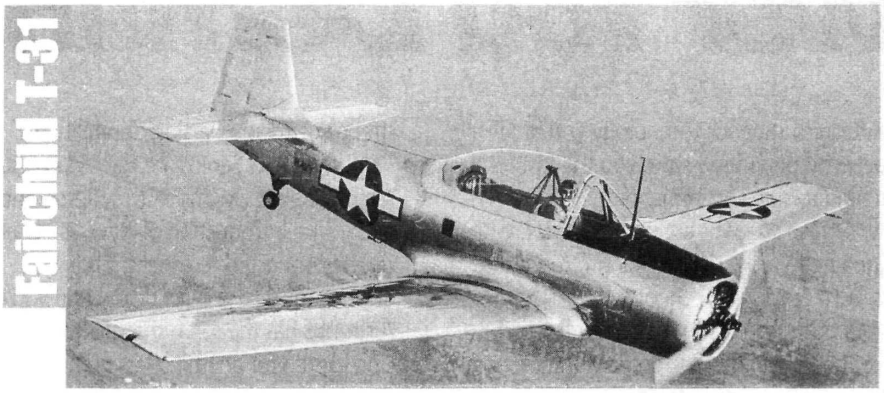
One of the best features of these new chargers is price. While the retail prices for the CG-330 and CG-335 are $119.99 and $149.99, respectively, you can find them "on the street" for $79 and $110, respectively.

If you have any questions, want to send me photos of your planes, or just want to say "Hi," you can reach me at larrym@airage.com.

**Addresses are listed alphabetically in the Index of Manufacturers on page 174.* ✈

PLANES WORTH MODELING

3-View Documentation for Scale Modelers



SPECIFICATIONS

Name: T-31 (Navy designation), XNQ-1 (Air Force)

Manufacturer: Fairchild

Type: two-seat primary/basic trainer

Wingspan: 41 ft., 5 in.

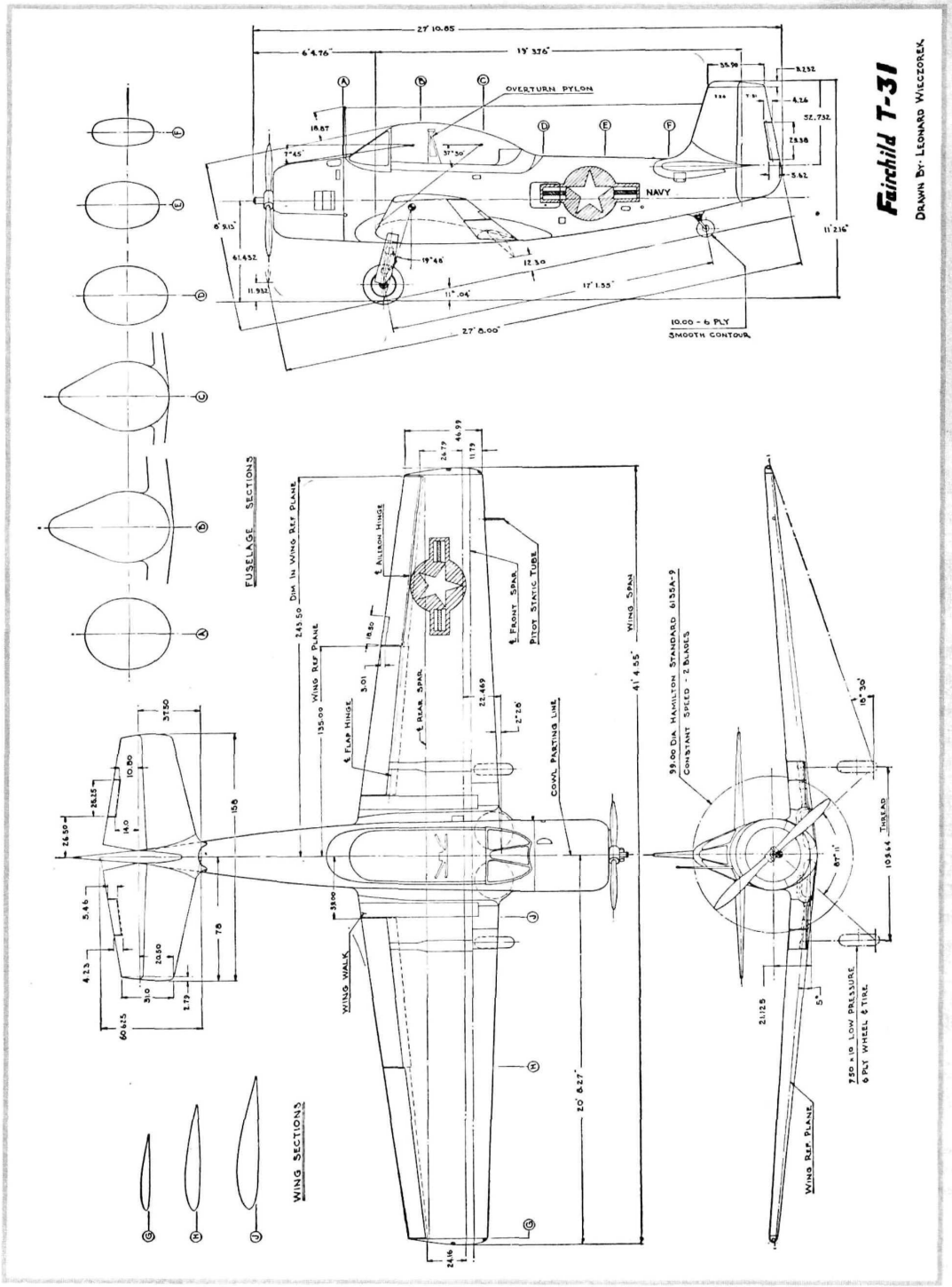
Length: 27 ft., 11 in.

Height: 9 ft., 10 in.

Gross weight: 3,750 lb.

Power: Lycoming R-680-13, nine-cylinder radial

Maximum speed: 170mph



If it had gone into production, the Fairchild T-31 would have been the first Navy-designed airplane used as a standard primary trainer for the U.S. Air Force; before 1947, the Navy had always used slightly modified versions of Air Force planes. Designed by Fairchild Aircraft, the T-31 (or XNQ-1, its Air Force designation) was the fastest primary trainer to date and featured a controllable pitch propeller, flaps, electronically operated retractable landing gear and all-metal skin with fabric-covered rudder, ailerons and elevators. Its unobstructed, one-piece bubble canopy provided instructors and students all-round visibility, and its cockpit instruments were arranged to match those found in a 600mph jet fighter or a 5,000-mile-long-range patrol plane. To help students recognize the instruments, the landing-gear handle was in the shape of a tiny landing-gear wheel, and the flap handle was shaped like the airfoil of a flap. The T-31 was designed as an acrobatic airplane to teach pilots basic maneuvers, such as stalls, spins, rolls, dive pull-outs and even loops.

—Debra Sharp

SCALE TECHNIQUES *by Bob Underwood*

Presenting your documentation

ALMOST 30 YEARS AGO, I received some very important advice concerning scale competition. At that time, the only R/C or control-line event offered was called "Precision Scale." Each competitor had to provide a "scale ruler," which was placed on the 3-view to show how many feet the model should measure. Judges were allowed to touch the model and count its rivets, and they measured major dimensions and anything else they wished. Needless to say, judging a model took a great deal of time!

Along with this style of judging, it should be noted that there was no limit to the amount of material a competitor could present. In some cases, pages and pages of photos and written documentation were turned over for judging. Indeed, the Manhattan phone book paled by comparison! In many cases, this occurred because the competitor did not wish to remove a single photo or page from a publication.

You could be awarded up to 15 points (of the 450 total) for your presentation. In other words, a relatively significant portion of the score could be earned not by your building or flying skills, but rather by doing your homework!

The sage advice I received was: don't overwhelm the judges with material—especially conflicting information or an item that proves your model is wrong! Keep the written material to a minimum, place it in a logical order and make it attractive.

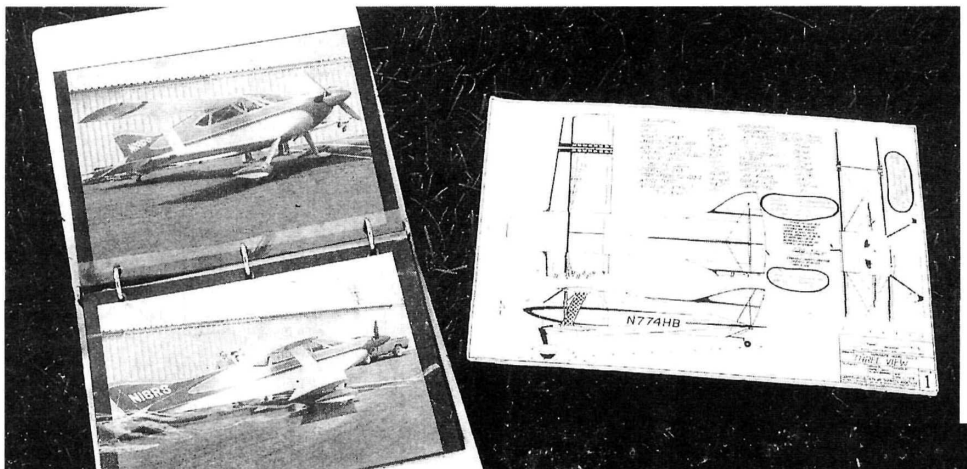
HOW MUCH IS TOO MUCH?

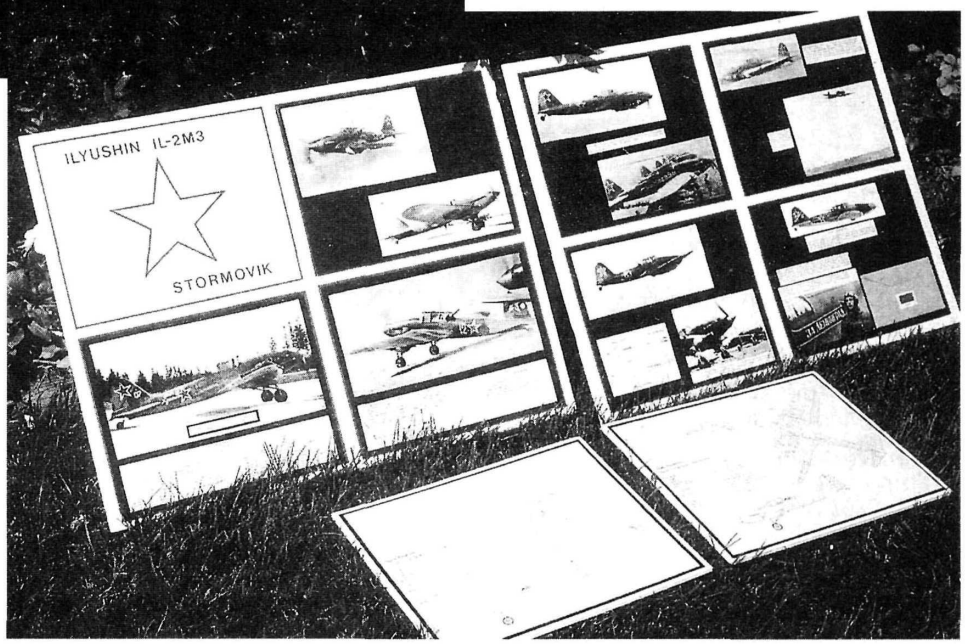
Today, with the exception of FAI competition, we find a limit regarding the presentation. In AMA and Scale Masters competition, you are allowed up to eight, 8½x11-inch pages (one side) or the equivalent area of photos and text in another format. The 3-views (up to three sets) count as one page and may be larger than 8½x11 inches. In Top Gun competition, you may have up to eight pages (or equivalent), not including the 3-views.

This process speeds up the judging considerably. It also means that you must be more discriminating in what you include. It is still wise to attempt to group your photos as much as possible. Place those that address major areas (fuselage, tail, wing, etc.) together. It's very frustrating to mentally hopscotch or continually flip pages to study parts of the model. I tend to start with a photo of the specific subject aircraft. With a one-of-a kind aircraft (such as the Alcor C.6.1., Whitman D-12 Bonzo, etc.), all of my photos are of the subject aircraft. On the other hand, nearly 37,000 Stormoviks were built, yet very few photos exist of the specific aircraft I used as a subject.

Accompanying the subject aircraft photo, you will find brief written information about the actual aircraft and an even briefer statement concerning the model. Since all of my models are scratch- or designer-built, I include a statement to that effect. I include a list of references and a signed statement indicating that I am the builder of the model. The latter is a holdover from earlier days, when such a statement was required. It certainly doesn't hurt to include it! Keep the written material brief, however; it shouldn't take the judge more than a minute to read it.

The presentation moves on to more specific photos, if available, and concludes with the color, finish and markings section. Generally, the model's outline is judged first and its color/markings/finish last. Craftsmanship depends a little on the type of competition. Some events, such as Top Gun and Scale Masters, tend to use a separate Craftsmanship judge. In those cases, the judging may occur *while* the other two items are taking place. In AMA competition, the panel of judges usually examines Craftsmanship last, although elements of the consideration may be discussed throughout the judging. Of course, in AMA Designer Scale, the judges *must* leave this element until the end because





Above: typical presentation arrangement: a three-ring binder and 3-view mounted on foamboard. Right: another possible presentation layout. The photos are matted on black, and the ID panel in the upper left is done in red. The 3-views are mounted on black matting and foamboard.

they are allowed to move closer to the model than the required 15 feet for the other two categories.

PRESENTATION COUNTS

You will usually find documentation presented in a book format. Ring binders and other types of folders are used, often with the material slipped into plastic covers that help to protect the photos. You may want to experiment with the plastic covers. They come in shiny and flat finishes, and the type of plastic cover can have a profound effect on the presentation—especially if the judging takes place in direct sunlight! In any case, I would be most careful about placing color documentation in one of these covers.

I'd like to suggest an alternative for your presentation. For the 1984 World Championships, I created a tri-fold panel display arrangement for the Alcor C.6.1. Understand that at the time, five judges were used for static. At earlier championships, I had noted that the judges constantly flipped pages and were virtually forced into a lock-step method of judging. So-o-o, to allow *all* the judges to view *any* photo at the same time, they were all on view! Did the method help me? The judges liked it and, interestingly, the next cycle saw the addition of a rule that required a duplicate set of 3-views. Top Gun requires the submission of three sets.

Brief, descriptive captions can be used near appropriate photos. For instance, on the Stormovik storyboard, a notation above the photo of the Leningrad markings reminds the judges that in the 1940s, most film registered red as black. As a result, the red arrow and black silhouette of Leningrad both appear black. Be careful not to insult the judges' intelligence; however, a gently worded reminder generally won't hurt.

It is sometimes possible to find documentation that describes a specific maneuver or scale operation as well. This can be very helpful. A year ago I listened to several people debate a description of the so-called "military pitch out" landing approach. Clearly, each individual had his own interpretation of the maneuver. Fortunately, I discovered a published drawing of the Russian "circle of death" maneuver for the Stormovik ground attack, and at flight time, I give the judges copies of it. Of course, whether I did the maneuver correctly is another story, but at least we were singing from the same hymnal!

I don't intend to suggest that one presentation method is better than another. Obviously, booklets are the presentation of choice among contestants. What *is* important is that your presentation doesn't become an "oh, by the way!" That is, a few days before the competition, you shove some photos into a folder and wind up handing the judges a conglomeration of "stuff" that doesn't do justice to your beautiful model. Oh, yes; in the photo of the Stormovik boards, you may notice a little envelope at the bottom right corner of board two. It contains the Federal Standard Color Chips. The envelope protects them from fading.

A last thought on this subject would be to resist the urge to include a bundle of "look at this part, but not that" photos and drawings. Judges go crazy trying to sort through a presentation that includes information about several versions of the aircraft, and asking them to ignore details or even outlines that *didn't* appear on the subject aircraft really diverts their attention. It's like a court judge who tells the jury to "disregard the previous statement" made by the witness—easy to say, difficult to do!

GET IN THE HABIT

Another consideration is to develop a routine when you get to the field. I've known a few individuals who actually developed a checklist to follow in preparation for static judging and flight! I'm not that organized, but I do, however, try to work out a specific routine to follow—especially at flight time. Of course, this isn't a bad idea to use with *all* your airplanes, but it is especially important with a scale model. Almost without exception, scale models tend to be more complicated, with more gadgets to plug in, hook up and fill.

Just in case you're interested, here's the finished product. Yes, it flies! The Stormovik weighs 18½ pounds and is powered by a K&B 100 swinging a 15x8 prop.

This point became painfully obvious to me during early flights with the new Stormovik. I was doing great preparing it for flight: ailerons plugged in, wings plugged in and setscrews tightened, clamp on the fuel line, connect fuel-can feed line to fill the tank .... Everything seemed fine until I discovered I was filling the muffler (and engine through the exhaust) and *not* the tank! That error is now firmly planted in my brain.

Establishing a routine at the flightline is equally important. Positioning your equipment in the same arrangement helps to keep the starting area safe and helps you to know where everything is. Every model creates a somewhat different scenario. Position the starter box so you can use it without getting the wire tangled in the prop. Place the transmitter toward the right, with its antenna extended. A small hatch that must be attached after turning on the switch is handy, along with the needed ball driver. Keep some score sheets in the box, ready for the judges.

DEVELOP A GOOD PIT CREW

Probably the most important ingredient in the mix at the flightline is your pit crew. I've watched contestants grab a nearby person at the last minute to fill this position; this is not a good thing! One might argue that anyone standing at the flightline *should* be able to fill the position, but you are, however, putting that person in a very awkward position.

If you have to enlist the aid of someone other than your usual pit crew member, spend some time "showing and telling" what you want them to do. One example of this is how you want them to hold the model. Sounds simple, but it's really not! Every scale model has "stuff" to steer clear of while you are holding it. These may be cosmetic items, such as antenna, guns and bombs. And how do you want the model held to demo the flaps, retracts, etc.? I'll never forget an incident during a past nats, not actually during competition, but during a live TV show. Joe Bridi and I were showing the audience some of those newfangled retracts on his pattern plane while my father held the model. Joe flipped the switch and the unrestricted Rhom Air gear snapped upward! Guess where Dad had his fingers?

Yes, both routine and proper care and feeding of the pit crew are very important. My daughter, Cathy, more often than not is able to attend major events to do the job. She is really good at it, and she knows my routines. Better yet, she knows me—my moods, my failings, whatever. She is great at critiquing my flight and remembering little details, which are, of course, what get you to the winners' circle.

PRODUCT NEWS

Latest product releases

INFORM YOUR CUSTOMERS! ***Model Airplane News*** **is interested in showing our readers your new products—here in Product News. If you'd like to see your products here, send us a clear photo and a press release that provides information about your product! We'll publish as many as space permits.**

Send your announcements to: Product News, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

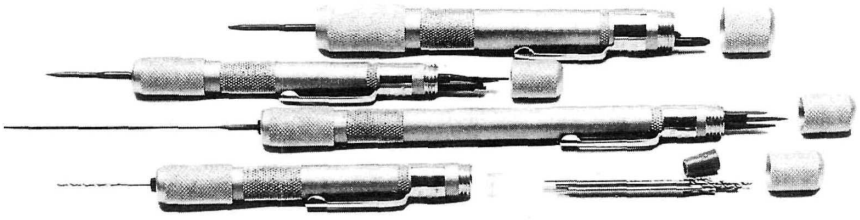
DESIGN FACTORY

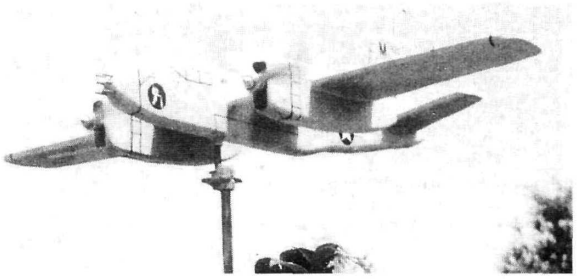
Tools for Modelers

New tools from Design Factory include a 10-blade mini screwdriver set, a 5-blade mini screwdriver set, a mini needle file set and a mini drill bit set. Also available (not shown) are a diamond-coated needle file set and a riffler file set.

Part nos.—DF-4001 (needle file set), DF-4002 (drill bit set), DF-4003 (5-blade screwdriver set), DF-4004 (10-blade screwdriver set), DF-4005 (needle file set), DF-4006 (riffler file set); **prices**—$14.95, $14.95, $19.95, $29.95, $21.95, $16.95 (plus $4 S&H).

Design Factory, P.O. Box 14037, Lenexa, KS 66285-4037; toll-free orders (888) 268-9933; fax (913) 268-9932.





AIRMODEL CO.

WW II Wind Vane Plans

Build a wind vane of your favorite WW II fighter or bomber out of 3/4-inch pine stock and 1/4-inch plywood. Add a full-spin propeller and spinner for more realism, and the model will look even better as it turns into the wind. The models have 24- to 34-inch wingspans; 40 popular designs are available.

Prices—$5 (plans); $2 (details/color photos).

Airmodel Co., P.O. Box 72, Ocala, FL 34478-0072; (352) 854-8324; email: riks@praxis.net.

WINDWARD R/C

Avatar R/C Ultralight

This schoolyard-size kit includes 31 machine-cut balsa parts, easy-to-follow photo-illustrated instructions, 168 pieces of hardware and full-size plans. You need only supply an engine, fuel tank, wheels and radio gear. A flat-bottom airfoil, large tail surfaces and a moderate wing loading make this plane a breeze to fly. The wings are removable for ease of transportation. Specifications: wingspan—50 inches; length—28.5 inches; engine recommended—.10.

Price—$109.95 (plus $5.95 S&H).

WindWard R/C, 20F Hudson Harbour, Poughkeepsie, NY 12601; phone/fax (914) 485-8346; email: rcwindward@aol.com.

AUTOGYRO CO. OF ARIZONA

Gyro Bee

This autogyro conversion kit of the popular Lazy Bee comes with laser-cut parts, machined Delrin rotor bushing, laser-cut, shaped airfoil blade set, landing gear and construction, setup and flying instructions. You only need to provide a 4-channel radio (no mixing required) and your engine or electric motor of choice (.26 4-stroke recommended). The Gyro Bee has a disk loading of 3.5 to 3.9 ounces per square foot and is especially suited to small-field flying. Also available is a video that features additional information on setup, blade tracking, test spin-ups into autorotation, takeoffs and landings.

Prices—$119 (deluxe conversion kit), $15 (video), $159 (combo that includes fuselage).

Autogyro Co. of Arizona, 3307 W. Renee Dr., Phoenix, AZ 85027; (888) 783-0101 or (602) 582-9428; email: giroman@prodigy.net.

APPLIED DESIGN

Mini-Sander

Now available with Applied Design's new continuous sanding belt, the Mini-Sander makes sanding easy. The new belt is made with load-free, 120-grit aluminum oxide over a flexible cloth backing, and it will last up to 10 times longer than traditional sanding belts. Assembly is easy; just slip the belt over the sander and adjust it.

Part no.—101; **price**—$4.50 each.

Applied Design, P.O. Box 3384, Torrance, CA 90501; (310) 375-4120; fax (310) 378-1590.

NORSEMAN DESIGN

F-4 Phantom Plus

This new profile kit comes with full-size plans, instructions, foam-core wings, precision-cut balsa and plywood parts and an extensive hardware package. Servos and fuel tank can be mounted inside the fuselage and the bolt-on wing is removable. Specifications: wingspan—36 inches; length—69 inches; wing area—512 square inches; engine required—.50 to .60.

Price—$119.

Norseman Design, P.O. Box 854, Apache Junction, AZ 85217-0854; (602) 982-7889.

HOBBICO

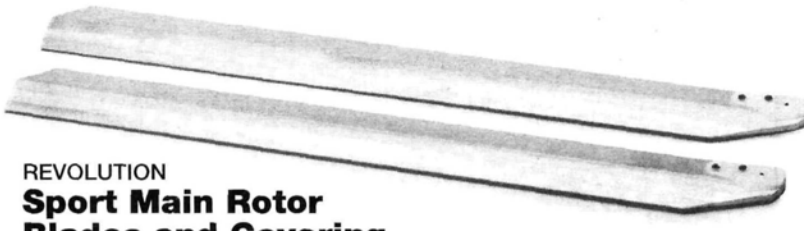
Piezo Gyros

Hobbico's new Multi-Purpose Piezo Gyro is the smallest, lightest, single-axis gyro available. The 1.1x1.1x0.6-inch, 0.49-ounce unit is ideal for increasing a model's maneuverability and control.

The new Airplane Piezo Gyro Stabilizer is the first gyro specifically designed for use in airplanes to help attain straight, scale-like flight and precise aerobatics.

Part nos.—HCAM4000 (multi-purpose gyro), HCAM4010 (airplane gyro stabilizer); **prices**—$109.99; $179.99.

Hobbico; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL, 61826-9021; (217) 398-6300, fax (217) 398-0008; website: www.hobbico.com.



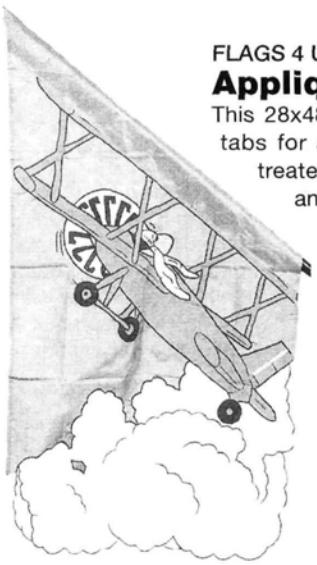
REVOLUTION

Sport Main Rotor Blades and Covering

These new clearcoated Sport Main Blades offer composite performance at an affordable price. They're made of a high-quality, multi-laminate wood, are clearcoated with urethane and will fit most .30- to .46-size helicopters. Revolution also offers adhesive-back covering sets with two-color tracking tape in white, red, yellow and black.

Prices—$49.95 (blades), $5.95 (covering set).

Revolution, 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; website: www.horizonhobby.com.



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Appliqued Flag

This 28x48-inch flag features leather and elastic tabs for a snug fit around a flagpole. It's UV-treated to prevent fading and deterioration, and it's coated for durability and to resist fraying. Flagpoles and brackets are also available.

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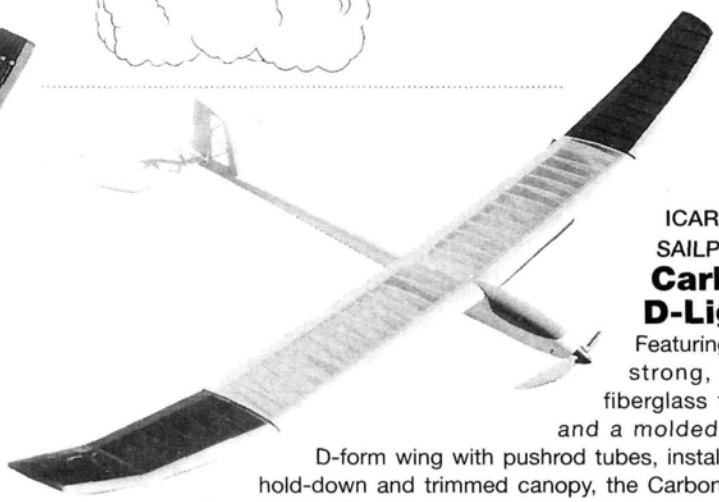
Flags 4 Us, 2015 Gottwald Ct., Garner, NC 27529; (919) 779-7430; fax (919) 779-3802.



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Carbon D-Light

Featuring a light, strong, white fiberglass fuselage and a molded carbon D-form wing with pushrod tubes, installed wing hold-down and trimmed canopy, the Carbon D-Light is an outstanding performer. Specifications: wingspan—71 inches; wing area—440 square inches; weight—19 ounces; airfoil—S4083. The kit is also available with one of two combination specials for LMR or all-up-last-down, which includes a Speed 400 motor with gearbox, speed controller and propeller.

Prices—$229 (kit), $329 (LMR or all-up-last-down combo), plus $10 S&H.

Icare Sailplanes, 381 Joseph-Huet, Boucherville, Quebec, Canada J4B 2C5; (514) 449-9094, fax (514) 449-3497; email: icare@telts.com; website: www.jonction.net/~icare/icare.htm.

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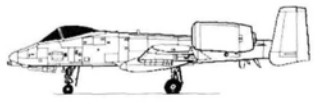
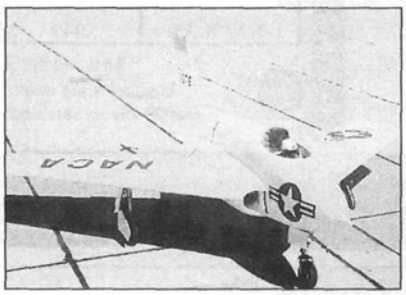


NAME THAT PLANE

Can you identify this aircraft?

Send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606 USA.

Congratulations to Mark Sell of Woodbury, PA, for correctly identifying the October 1998 mystery plane. The 23-foot-long, 26-foot-span X-4 was a swept-wing, semi-tailless airplane designed and built for NACA by Northrop Aircraft Inc. in the early '50s. Powered by two Westinghouse XJ-30 turbojet engines, the X-4 was capable of speeds of up to 620mph at altitudes of up to 40,000 feet. Only two X-4s were ever built and both exhibited inherent longitudinal stability problems as they approached the speed of sound; however, data derived from those test flights were important in the development of future transonic designs.



The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. mail) and will receive a free, one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free, one-year extension of his subscription.

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New F5B World Record

IN GERMANY THIS PAST SUMMER, Thomas Pils and Jerry Bridgeman took home the F5B Gold and Silver medals. F5B is an electric-powered soaring/gliding event that involves distance and duration. The distance portion of the F5B task—running laps—presents the greatest challenge. (A lap is defined as passing in one direction only; namely, from base A to base B. Returning from base B to base A is another lap.) Not only did Thomas and Jerry meet the challenge, but Thomas also flew a record-breaking 39 laps. In the early years, starting in 1986, 20 to 23 laps were tops. By 1996, the count had jumped to 36. But now, on one run—his sixth of the competition—Thomas Pils set a new standard of 39 laps.

Thomas Pils and his Verminator. The 61-inch-span model weighs nearly 62 ounces.

MODEL AND FLIGHT STATISTICS

Wingspan: 61.42 in.

Surface area (wing and stab): 367.97 sq. in.

Total weight: 61.98 oz.

Motor: Aveox Hyperco geared on 27-1000SCR Sanyo cells

Controller: Steve Neu brushless

Propeller: 14.5x14

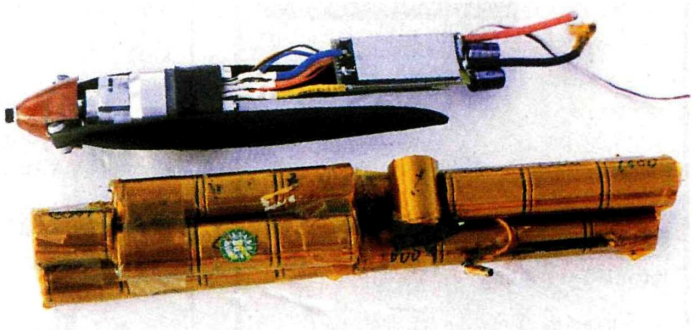
Flight speed (fastest time from base A to base B): 129.0808mph

The process of running F5B distance (the first part of the flight; the second half of the flight is a 5-minute duration and landing) involves flying for 3 minutes back and forth between "parallel visual planes" that have been placed 150 meters apart (base A and base B). The laps, however, must be completed while the motor is turned off. One may only run the motor "outside," usually to the left of, base A. The flier must use his motor only to climb to altitude; then he flies the plane back and forth until he decides that he needs to climb again. He then exits base A, turns the motor on and climbs, then turns it off and reenters the course. There is only one limitation: only 10 climbs are allowed to make all laps.

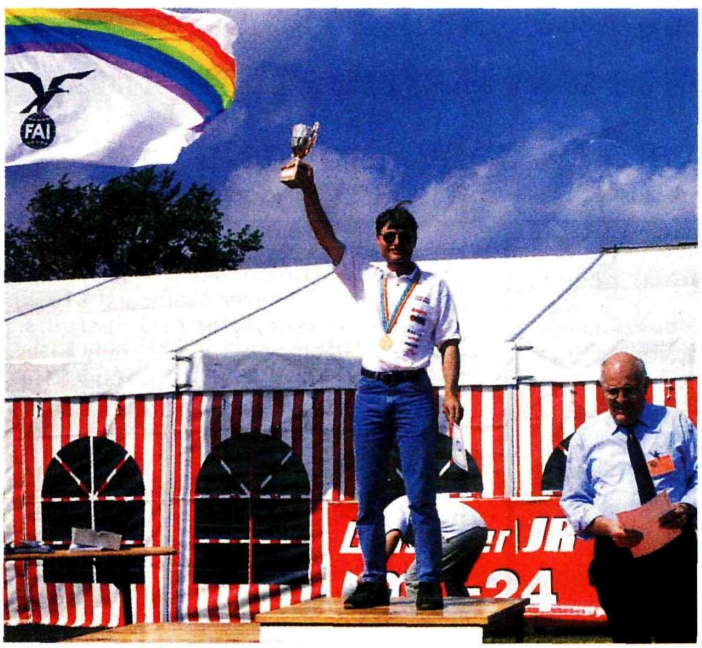
When time runs out, the flier must complete a "limbo" pass in 1 minute. (A "limbo" consists of flying the model *below* 3 meters just at the plane of base A. This often involves some spectacular high-speed passes and/or crashes.) Limbo completion makes the lap score official and signals the beginning of the 5-minute duration.

Thomas's 39-lap flight began with good thermal conditions in the area. Steve launched the model, I started the 3-minute watch and Jerry called the turns.

Watching the time put me in the best position to know just how well Thomas was running his laps. (We use a 36-lap time base of 20 seconds per set of four.) Thomas was gaining more than a second during each set of four laps. After completing 36, he still had 13+ seconds left. Climbing for about 2 seconds, he finished 38 and turned to go for one more. When we heard the base B signal before the out-of-time signal, we all nearly jumped out of our shoes. Now all that was left was for Thomas to get through the limbo. He made an easy limbo and did a good duration.



The winning power combination: an Aveox Hyperco geared motor and 14.5x14 propeller with a Steve Neu brushless controller and 27-1000SCR Sanyo cells. The system provides more than 2hp—about 1,600 watts—to the propeller.



Thomas holds aloft the 1998 F5B World Championship trophy presented to him by Dieter König, contest manager and awards director.

It was most unbelievable, and I was right there. Being a part of this record-breaking flight was the greatest thrill of my F5B career.

What will happen next time? We must wait to see. San Diego is the place for the year 2000 F5 Worlds, and I am sure there will be some fliers—including Thomas—who will seek to break the 39-lap record. My advice is to be there!

PHOTOS BY BOB SLIFF